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Supreme Court of the United States

OCTOBER TERM, 1944

No. 556

SINCLAIR & CARBOLL COMPANY, INC.,
PETITIONER,

vs.

INTERCHEMICAL CORPORATION

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

United States Circuit Court of Appeals

FOR THE SECOND CIRCUIT.

INTERCHEMICAL CORPORATION,

Plaintiff-Appellant,

v.

SINCLAIR & CARROLL CO., INC.,

Defendant-Appellee.

On Appeal from the United States District Court
for the Southern District of New York.

TRANSCRIPT OF RECORD.

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1,439,646	Doughty	Dec. 26, 1922	961
1,450,642	McElroy & Clarke	Apr. 3, 1923	963
1,752,462	Smith	Apr. 1, 1930	967
1,806,465	Clewell	May 26, 1931	969
1,884,533	Bradley	Oct. 25, 1932	971
1,898,673	Lawrence	May 17, 1932	976
1,954,450	Lawrence	Apr. 10, 1934	986
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UNITED STATES LETTERS PATENT.

Patent Number	Patentee	Date	
1,261,885	Wood, *et al.*	Apr. 9, 1918	993
1,592,806	Brunell	July 13, 1926	998
1,665,185	Brunell	Apr. 3, 1928	1005

BRITISH LETTERS PATENT.

249,472	Ullstein	1926	1013

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EXHIBITS

Plaintiff's Exhibit 1.

Stipulation as to Proofs.

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties hereto as follows:

1. Plaintiff, Interchemical Corporation, formerly known as International Printing Ink Corporation, is a corporation of the State of Ohio, has a place of business at New York, New York, within the Southern District of New York, and is the owner of Letters Patent in suit, No. 2,087,190.

2. Defendant, Sinclair & Carroll Co., Inc., is a corporation of the State of New York, and has a place of business at 591 Eleventh Avenue, Borough of Manhattan, City and State of New York, within the Southern District of New York.

3. Reserving the right to object to the admission in evidence of United States and foreign patents, and publications, on any other ground or for any other reason than that copies are offered instead of originals, it is stipulated:

(a) that uncertified printed Patent Office copies or photostatic copies thereof, of United States and foreign Letters Patent may be introduced in evidence by both parties at the trial in lieu of the originals or certified copies thereof, with the same force and effect as the originals duly proved, and the dates appearing thereon shall be accepted as correct, subject to correction should error appear, and that the "Accepted" and "Public" dates given on British and French patents, respectively, shall be accepted as their dates of publication, except that it shall not be presumed under this stipulation that the disclosure in any United States patent as granted is the same as the disclosure in the application for said patent as filed or the same as the disclosure in any application of which said patent application

is claimed to be a division or a continuation if the contrary is shown to be the fact; and

(b) that photostatic copies of printed publications may be introduced in evidence at the trial in lieu of the original thereof, with the same force and effect as originals thereof duly proved, and the dates of publication appearing thereon shall be accepted as correct, and if no dates of publication appear thereon, then such publications shall be regarded as printed publications at least as early as the date they were received by any library in the United States, as indicated by the official receiving stamp of said library on said publication or as certified with reference to the records of said library by affidavit of an official thereof, subject to correction should error appear.

ROBERT W. BYERLY,
Counsel for Plaintiff.

WALTER H. FREE,
Counsel for Defendant.

Dated: New York, N. Y., December 11, 1942.

Plaintiff's Exhibit 2.

Copy of Patent No. 2,087,190.

(Opposite ☞)

Patented July 13, 1937 2,087,190

UNITED STATES PATENT OFFICE

2,087,190

PRINTING INK

Albert E. Gessler, Ardsley-on-Hudson, N. Y., assignor, by mesne assignments, to The International Printing Ink Corporation, New York, N. Y., a corporation of Ohio

No Drawing. Application July 14, 1932, Serial No. 622,453. Renewed April 11, 1936

15 Claims. (Cl. 134—36)

The present invention relates to printing inks and has for an object the preparation of a novel type of printing ink, which possesses many advantages over the printing inks heretofore known and overcomes many of the disadvantages associated with the procedure which it has been necessary to use in order that such inks may be properly applied to produce a satisfactory print.

Heretofore, printing inks have in general been made by grinding pigments in oils or oil-varnishes, or both. Such oils or varnishes have absolute viscosities of 5 poises or above at 25° C., measured by the method applied to varnish viscosities (Gardner's Physical and Chemical Examination of Paints, Varnishes, etc., fifth edition 1930, pp. 246, 152, 153) and have been characterized by their relatively slow rate of drying depending upon polymerization, oxidation and/or absorption and, as a consequence, have presented great difficulty in printing processes by greatly delaying the speed of operation. This has not only necessitated the expense and maintenance of large and cumbersome auxiliary equipment and extra labor, but has also resulted in a dependency of the printing process upon the time required to obtain a complete drying.

In order to overcome these difficulties, it has been customary to incorporate in the inks varying amounts of driers which have the ability to accelerate the speed of the oxidation and/or polymerization of the oil varnishes. However, even with all possible acceleration, the drying of the prints takes many hours or even days, necessitating in addition to the great delay in time, extra labor to remove, to store, and to return to the machines the printed material and also in many cases a great waste of paper in the form of slip-sheets which must be rolled up or stacked between the prints in order to avoid offsetting, rubbing off, smudging or sticking together.

It has also been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers. As is well known, the cellulose solvents used in these lacquers are characterized by a high degree of volatility. Indeed, this characteristic is considered an advantage in lacquers, for in the ordinary use to which lacquers are put, a rapid drying or hardening is highly desirable. However, it is obvious that such rapid drying renders inks made on this principle unsuitable for printing from plates or rollers; for, while they may be applied to printing plates or rollers, they will quickly dry and harden thereon and they will have only the effect of yielding dry or half dry material to the printing form from which, therefore, no satisfactory impression can be made on the material to be printed.

I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided. Naturally, if the solvents are too slow in evaporating, the same difficulties, which occur in the case of ordinary oil varnish inks, are encountered. In this respect I have found that certain such high boiling solvents, very well adapted to dissolve cellulose compounds, have at room temperature such slow drying properties that, while they may be employed as solvents in this ink, and while an excellent impression may be transferred to the surface to be printed upon, the impression will nevertheless be so moist that it is likely to become blurred or smudged by rubbing after many hours or even days. This defect, however, may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit, at temperatures elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilise rapidly, while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile.

By room temperatures, I mean the ordinary temperatures of a room in which technical work is carried on, which is generally accepted to be 20° to 25° C.

As above indicated, the present invention makes use of the characteristics of these solvents having high boiling points and high vapor pressures at elevated temperatures.

The referred to solutions, in contradistinction to lacquer solutions which require highly volatile solvents, are characterised by their very low rate of evaporation at temperatures approximating room temperature and by their ability to manifest a relatively high degree of volatility when, subjected to temperatures higher than room temperature. The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure at room temperature, but yet further characterised by a rapid rise in their vapor pressure curves upon elevation of the temperature,—that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised. Among this peculiar class of solvents I have found as an example diethylene glycol monobutyl ether to be a solvent for nitro-

cellulose and many natural and artificial gums, very well adapted to the purposes of this invention. This solvent at room temperatures remains fluid and moist for a long period of time. When heated to about 100° C. or above, the rate of vaporization is greatly accelerated and, when used in the ink of this invention, produces a print which dries almost instantaneously when subjected to such a heat treatment.

The printing ink above briefly described may be further admixed with varying amounts of another and different class of oils or high boiling solvents possessing a very low vapor pressure over a wide range of temperatures, and characterized in that they are practically non-volatile if exposed to the heat necessary for the process. This admixture acts as a plasticizer and tends to prevent the brittle characteristic of a film consisting of nitrocellulose or gums alone.

The following specific example is illustrative of my invention as applied to the production of a yellow printing ink particularly. The ink may be made up as follows: 100 parts of chrome yellow, 35 parts of nitrocellulose (low viscosity), 55 parts of diethylene glycol monobutyl ether, 10 parts of dibutylphthalate, and 10 parts of blown castor oil.

The above composition may, for example, be prepared by grinding or otherwise dispersing the pigment in a solution of the nitrocellulose in diethylene glycol monobutyl ether. The two other ingredients may be introduced in such order as may be expedient. It will, of course, be recognised that the yellow pigment may be replaced by any suitable pigments or dyestuffs and/or mixtures thereof; that the nitrocellulose may be replaced by other cellulose compounds and/or by natural or synthetic resins. Moreover, the dibutylphthalate may be replaced by any other suitable agent, effective to prevent brittleness in the finished product. Also, the blown castor oil which has been included in the specific formula given may be replaced by other suitable materials. It may be desirable in some circumstances to omit the last two types of ingredients referred to in the illustrative formula, namely, those which have been added in order to offset extreme hardness and brittleness.

Diethylene glycol monobutyl ether is a practically odorless, saturated, aliphatic or open-chain chemical compound of carbon, hydrogen and oxygen.

The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures. These important properties of diethylene glycol monobutyl ether, the preponderant solvent constituting the major part of the liquid component of the ink in the example given, may, for comparative purposes, be indicated numerically in terms of its vapor pressure at different temperatures which, as determined by Brewer and Gardner in "Industrial and Engineering Chemistry", vol. 29, No. 2, p. 179, February, 1937, are as follows:

	Mm. of mercury
At 20° C.	0.02
At 100° C.	6.4
At 150° C. about	60.0

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at ordinary room temperature. The vapor pressures of my preponderant solvent at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid, according to Brewer and Gardner, is 0.45 mm. at 100° C. and 1.4 mm. at 150° C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100° C. or 150° C.

With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly. Thus a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use. This method of printing is not claimed herein as it forms the subject matter of my co-pending application, Serial No. 15,944, filed April 12, 1935, which is in part a continuation of this application.

The novel ink and process described above are not only capable of utilization in printing upon paper, but they are also adapted for use in making very satisfactory prints upon many other surfaces, such as for instance textiles or metallic surfaces, or the lacquered surfaces of Cellophane, or the like, where the production of a satisfactory print has heretofore been much restricted.

It is apparent that such an ink as has been described does not necessitate the admixture of driers, does not set or harden on the printing rollers or plates, but is yet capable of being dried very quickly when subjected to suitable temperatures after being printed, by the evaporation of the solvent from the thin layer of the print. The finished products are flexible prints in which the pigment is well protected against being rubbed off. They are not softened by moisture, grease, or chemical influences and possess practically no odor. The ink adheres securely to almost every type of surface.

What I claim is:

1. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

2. A printing ink which is substantially non-drying at ordinary temperatures and dries in-

stantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and substantially 73% of the liquid component being a chemical compound containing carbon, hydrogen and oxygen, which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

3. A printing ink which is substantially nondrying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

4. A printing ink which is substantially nondrying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is an ether including one butyl radical and one diethylene glycol radical and having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol.

5. A printing ink which is substantially nondrying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is monobutyl ether of diethylene glycol.

6. A printing ink which is substantially nondrying at ordinary temperatures and which dries rapidly at 150° C. consisting of a coloring matter dispersed in a viscous fluid vehicle consisting of a liquid component the major portion of which is an organic solvent forming stable solutions with both nitrocellulose and resin having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol, and a solid component completely dissolved in the liquid component in an amount at least 47% of the amount of said liquid component, said solid component being a member of the group consisting of natural and synthetic resins and low viscosity cellulose esters.

7. A printing ink which is substantially nondrying at ordinary temperatures and which dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in a liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a cellulose compound, and the major part of the liquid component being a chemical compound which dissolves and forms a stable solution with the solid component and which has a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

8. A printing ink which is substantially nondrying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being an aliphatic chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

9. A printing ink which is substantially nondrying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a saturated chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

10. A printing ink which is substantially nondrying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a

vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having an open-chain structure and a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

11. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and being a saturated compound forming a stable solution with the solid component.

12. A printing ink adapted for use on paper, comprising a coloring material in a vehicle containing essentially a binder for the coloring material and a solvent for the binder, said binder forming a stable solution in said solvent and being present in amount sufficient to give the ink the consistency of ordinary oil-varnish printing inks, and to protect the coloring material against being rubbed off when the ink is applied by an ordinary printing press, and substantially all of said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and developing such a marked increase in vapor pressure at elevated temperatures of 100° C. or above, to which printed paper can be subjected, that its vapor pressure at 150° C. approximates that of ethyl alcohol at ordinary temperatures and that it practically immediately evaporates from a thin film of ink at such temperatures, whereby said ink is stable on the printing press and capable of being immediately dried upon the application of heat following the printing operation.

13. A printing ink consisting of pigment dispersed in an organic viscous vehicle, consisting of a liquid component and a solid component—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and being dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, and to bind the pigment to paper when the ink is applied by an ordinary printing press, and substantially all of the liquid component having a vapor pressure at 20° C. which is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

14. A printing ink comprising a coloring material in a vehicle consisting of a solid component, composed principally of a binder of the group consisting of natural and synthetic resins and cellulose esters, and a liquid component, composed principally of volatilizable solvent for the binder, said binder being present in amount approximately one-half to two-thirds of said liquid component, by weight, and said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and having a vapor pressure at 150° C. equivalent to that of ethyl alcohol at room temperature.

15. A printing ink having a consistency suitable for ordinary printing and comprising a coloring material and a vehicle therefor including a liquid component and a solid component, said solid component being principally a binder for said coloring material, and said liquid component consisting essentially of a minor proportion of an agent adapted to prevent brittleness of the binder and a major proportion of a volatilizable solvent having vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and a vapor pressure at elevated temperature of 150° C. equivalent to that of ethyl alcohol at ordinary room temperature.

ALBERT E. GESSLER.

Plaintiff's Exhibit 3.

Assignment.

WHEREAS, ZINSSER & COMPANY, INC., a New York corporation, of Hastings-on-Hudson, New York, is the sole and exclusive owner of an application for Letters Patent of the United States, which invention is described as:

> Application, Serial No. 622,453, filed July 14, 1932 by Albert E. Gessler, for Improvements in Printing Ink and Method of Utilizing Same;

and of all inventions which have been or may be claimed in said application or any applications filed therefor; and

WHEREAS, THE INTERNATIONAL PRINTING INK CORPORATION, a corporation of the State of Ohio, having an office and place of business at 75 Varick Street, New York City, New York, is desirous of obtaining the entire right, title and interest in and to said inventions and application and all Letters Patent of the United States which may be granted therefor;

NOW, THEREFORE, in consideration of One Dollar ($1.00) and other good and valuable considerations, receipt of which is hereby acknowledged, said ZINSSER & COMPANY, INC., has sold, assigned and transferred, and by these presents does sell, assign and transfer to said THE INTERNATIONAL PRINTING INK CORPORATION, its legal representatives and assigns, the entire right, title and interest in and to the hereinbefore identified application for Letters Patent of the United States, in and to all inventions claimed or which may be claimed in said application or any additional applications to be filed therefor, and in and to all Letters Patent of the United States which may be granted on said applications or any of them or for said inventions or any of them, together with all reissues or extensions of such Letters Patent or any of them.

Plaintiff's Exhibit 3.

For the same considerations, said ZINSSER & COMPANY, INC., its legal representatives and successors, covenant and agree to execute and deliver to said THE INTERNATIONAL PRINTING INK CORPORATION, its successors and assigns, any further documents or instruments which may be necessary and proper to enable said THE INTERNATIONAL PRINTING INK CORPORATION, its successors and assigns, to file applications for said inventions or any of them in any country where it may elect to file such applications, and that may be necessary and proper to vest in said THE INTERNATIONAL PRINTING INK CORPORATION, its successors and assigns, the title herein conveyed, and to enable such title to be recorded in the United States Patent Office and in foreign countries where such application or applications may be filed.

IN WITNESS WHEREOF, ZINSSER & COMPANY, INC. has caused this instrument to be filed and its corporate seal to be applied hereto by its officers thereunto duly authorized, this 2nd day of April, 1935.

ZINSSER & COMPANY, INC.

By J. L. BERSTON,
Vice President.

(SEAL)

Attest:

H. T. STABER,
Secretary.

Plaintiff's Exhibit 4.

STATE OF NEW YORK }
COUNTY OF WESTCHESTER } ss.:

On the 2nd day of April, 1935, before me personally appeared J. L. BERSTON and H. T. STABER, to me known to be the persons who executed the foregoing instrument as president and secretary, respectively, of ZINSSER & COMPANY, INC., a corporation of the State of New York, and acknowledged that they being duly authorized to execute the same on behalf of said corporation did execute the same as their free and voluntary deed and act and the free and voluntary deed and act of said corporation.

R. A. NEELY,
Notary Public

Notary Public
Westchester Co., N. Y.
My Commission Expires
March 30, 1936

(NOTARIAL STAMP)

(NOTARIAL SEAL)

Plaintiff's Exhibit 4.

Defendant's Answers to Plaintiff's Interrogatories.

To the following interrogatories propounded by plaintiff under Rules 33 and 34 of the Rules of Civil Procedure, defendant makes verified answer by its duly qualified officer, as follows:

1. Did you make or sell between July 13, 1937 and August 28, 1941, any typographic printing ink adapted to be dried or set by heat and containing a pigment dis-

persed in a vehicle composed of a solid component dissolved in a liquid component?

Answer: Yes.

2. Have you between July 13, 1937 and August 28, 1941, sold or furnished any such printing inks for use on rotary typographic printing presses provided with heating units for heating the printed matter?

Answer: Yes.

3. If your answer to the preceding interrogatory is in the affirmative, state whether any of the printing inks which you furnished for use on rotary typographic presses provided with heating units were sufficiently stable on the rollers of such presses to make possible their use on such presses, and whether any of such inks dried or set when the paper on which they were printed was passed through the heating units of said presses.

Answer: Yes, it being understood that the term "stable" as used in this and other interrogatories means "unchanging" as the term is defined by plaintiff.

4. If your answer to interrogatory 3 is in the affirmative, state when you first furnished such inks.

Answer: April 12, 1938.

5. Before you first furnished such inks were you informed that the company or companies to whom you proposed to sell them had in its plant or their plants rotary typographic printing presses equipped with heating units for heating the printed paper?

Answer: Yes.

8. If your answer to Interrogatory 3 is in the affirmative, identify specifically by color and identifying name some printing inks which you sold between July 13, 1937 and August 28, 1941, to Crowell-Collier Publishing Company, Springfield, Ohio, which were stable enough on the rollers of the purchasers' presses to permit their use thereon

and which dried or set when the paper was passed through the heating units of such presses.

Answer: Defendant sold the following inks to the Crowell-Collier Publishing Company, Springfield, Ohio, during February, 1941:

Fisher Blue
Cudahy Blue
Fisher Red
Cudahy Red
Fisher Yellow
Black

9. Furnish to plaintiff's attorney a sample of each of the inks specified in your answer to Interrogatory No. 8 and a sample of the solvent used in each of said inks and state the classes of ingredients in said inks.

Answer: Defendant has furnished to plaintiff's attorney one sample of each of said original inks, and also one sample of defendant's solvent, "502-C Ink Oil", which was used in each of said inks. The proportions of the classes of ingredients contained in the inks are as follows:

Fisher Blue	—Pigment	49.4%	
	Solvent	25 %	
	Resin	19 %	
Other ingredients		6.6%	(1.9% solid, 4.7% liquid)
		100 %	

Cudahy Blue	—Pigment	48 %	
	Solvent	25.7%	
	Resin	19.4%	
Other ingredients		6.9%	(2% solid, 4.9% liquid)
		100 %	

Plaintiff's Exhibit 4.

Fisher Red	—Pigment	35 %
	Solvent	25.2%
	Resin	27.3%
Other ingredients		12.5% (5.9% solid, 6.6% liquid)
		100 %

Cudahy Red	—Pigment	36 %
	Solvent	25.2%
	Resin	26.4%
Other ingredients		12.4% (6% solid, 6.4% liquid)
		100 %

Fisher Yellow	—Pigment	57.2%
	Solvent	13.9%
	Resin	17.5%
Other ingredients		11.4% (4% solid, 7.4% liquid)
		100 %

Black	—Pigment	80.8%
	Solvent	28.3%
	Resin	4.6%
	Gilsonite	18.5%
Other ingredients		17.8% (13.3% solid, 4.5% liquid)
		100 %

The "other ingredients" referred to above consist of linseed varnish and/or perilla varnish, wax and/or grease, drier, etc.

10. Did the defendant receive from plaintiff before the filing of the Bill of Complaint herein a written notice charging defendant with infringement of the patent in suit?

Answer: Yes, by letter dated July 9, 1941.

Sinclair & Carroll Co., Inc.

By Roy Carroll,
Vice President.

Plaintiff's Exhibit 5.

VERIFICATION

STATE OF ILLINOIS, }
COUNTY OF COOK, } ss.:

ROY CARROLL, being duly sworn, deposes and says that he is Vice President of Sinclair & Carroll Co., Inc., the corporate defendant herein; that he subscribed the foregoing answers to plaintiff's interrogatories on behalf of said corporate defendant; that he has read the answers and knows the contents thereof, and that the same are true and correct.

ROY CARROLL.

Sworn to and subscribed before me }
this 1st day of December, 1942. }

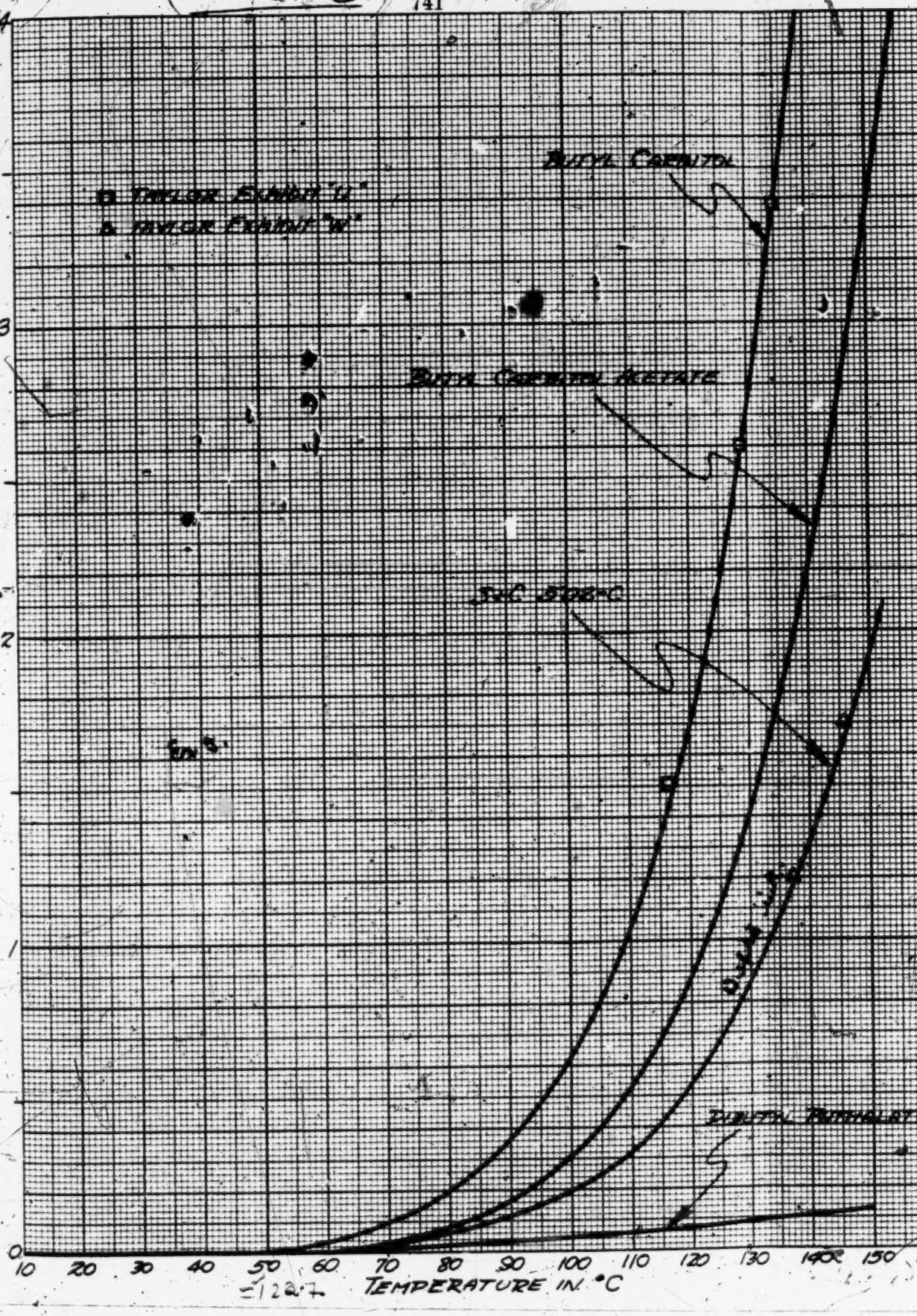
LOUISE E. GROSS,
Notary Public.

(SEAL)

Plaintiff's Exhibit 5.

Graph.

(*Opposite* ☞)

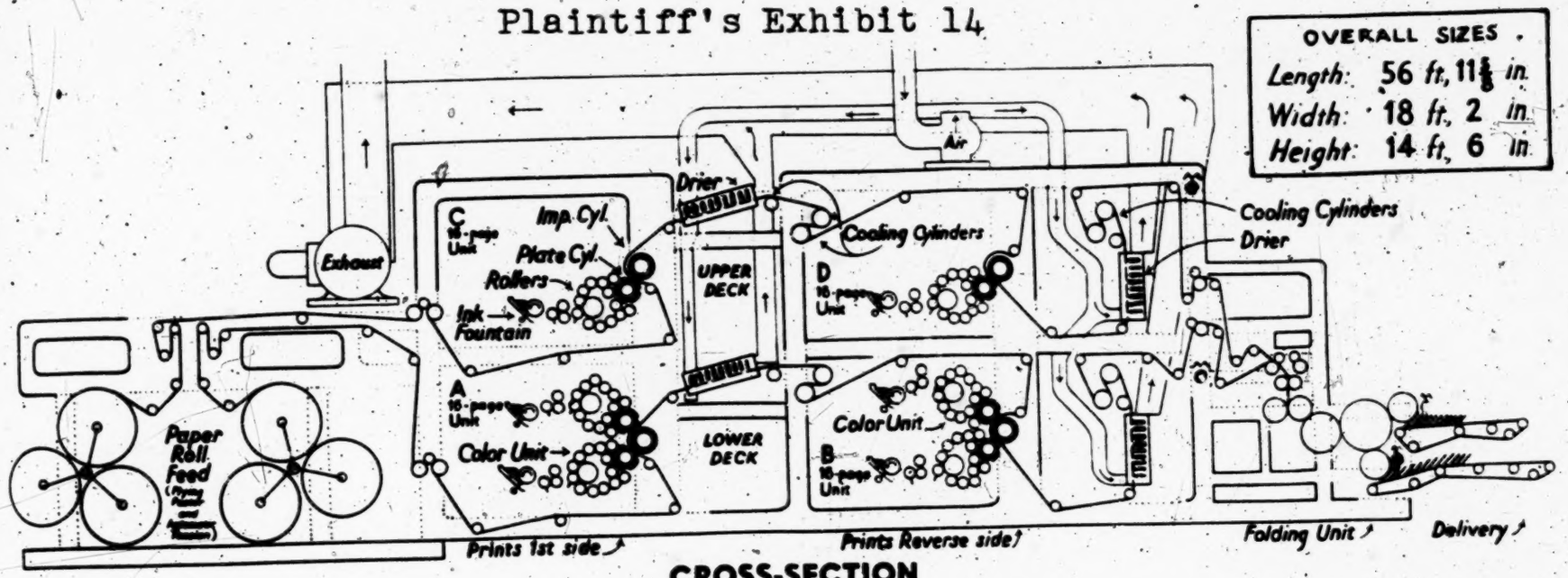

VAPOR PRESSURE IN cm
4
3
2
1
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
TEMPERATURE IN °C
Taylor Solvent "A"
Taylor Solvent "W"
Butyl Cellosolve
Butyl Cellosolve Acetate
Butyl Phthalate

Plaintiff's Exhibit 14.

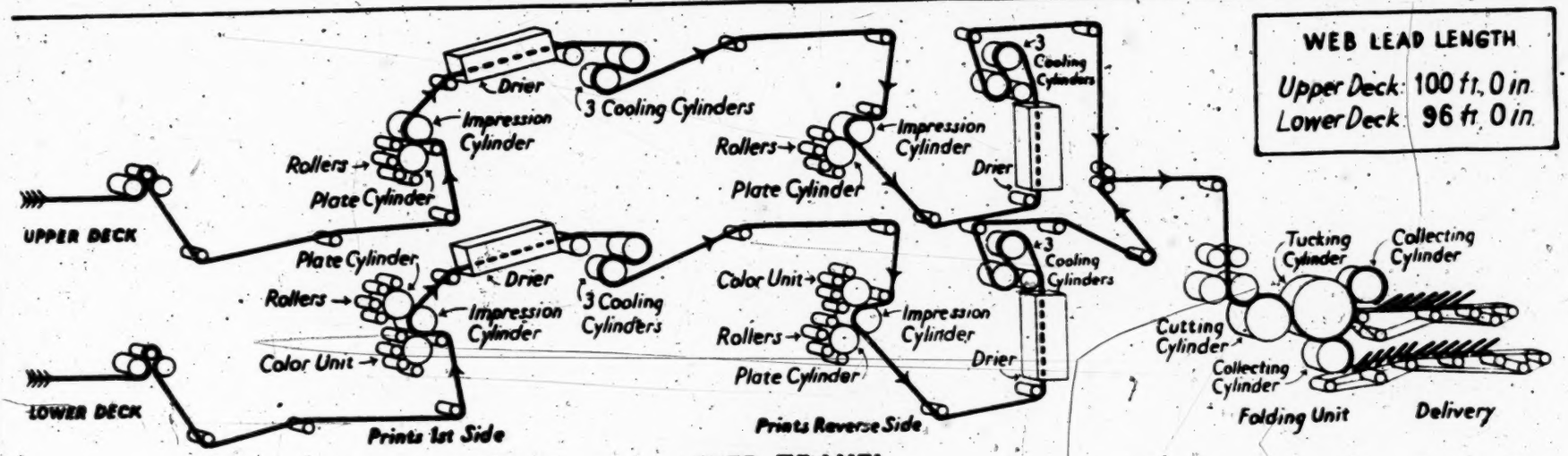
Chart.

(*Opposite* ☞)

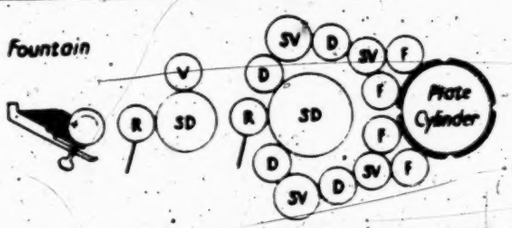
Plaintiff's Exhibit 14



CROSS-SECTION



WEB TRAVEL



Each Unit: 4 Form Rollers F
4 Distributors D
2 Ductors R
1 Vibrator V
4 Steel Vibrators SV
2 Steel Distributing Drums SD

DETAIL OF INKING MECHANISM AND INK DISTRIBUTION
(One Unit)

Plaintiff's Exhibit 21.

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

December 21st, 1932

Mr. J. Kindelberger,
Kalamazoo Vegetable Parchment Paper Co.,
Parchment, Michigan

My dear Mr. Kindelberger:—

I had the pleasure this morning of showing to your Mr. Horton at the New York Office some breadwrappers run with our new quick drying inks, and Mr. Horton advised me to write you in connection with same.

Our quick drying inks are a recent development, and will dry instantly by applying them to heat. We have made tests on very many paper stocks during the past year, and are now ready to offer these inks to the trade.

For Rotary presses we have had the best results by running the paper over a steam jacketed cylinder, glassine, parchment or breadwrapper paper stock, and found that the ink dries perfectly at a speed of about 325 feet a minute with 10 pounds of steam. For higher speeds, we found that it was necessary to put on an extra cylinder, and in so doing, the ink dried well up to a speed of 700 feet per minute.

The printing qualities of the ink are excellent—it lays well and prints well, running clean and sharp at all times. On breadwrapper stock we found that it was not necessary to dry the ink before running it thru the wax, as the heat of the wax completed the drying of the ink, and from tests here, it did not bleed in the wax.

If you would be interested in an ink of this kind, we should be glad to arrange for a demonstration at your plant if you may wish.

Awaiting to hear from you further, and with the compliments of the season, I am

Very cordially yours,

CALVIN DETRICK.

CD-JS

Plaintiff's Exhibit 22.

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

January 5th, 1933

Kalamazoo Vegetable Parchment Co.,
Parchment, Michigan

Att'n Mr. R. A. Hayward, Vice Pres. & Gen. Mgr.

Gentlemen:—

We are pleased to acknowledge receipt of your letter of December 29th, and, under ordinary circumstances would be very pleased to send out to you any quantity you may desire of this ink to try, but inasmuch as it is entirely new, we have been carrying on our demonstrations more or less in secrecy. Furthermore, inasmuch as your pressmen have had no experience with an ink of this character, it would be almost necessary that I be there when the test is run.

We feel that the ink is most satisfactory for your work and requires no high pressure salesmanship, as the demonstration will prove the merits of the product. This ink is only practical for the large users, and we feel certain it will afford a very great saving to you.

Whenever it is agreeable to you, I would be very glad to go to Parchment if you will advise me the date most convenient to you.

Awaiting your further advices and with our best wishes for the New Year, I am

Very sincerely yours,

CALVIN DETRICK.

CD-JS

Plaintiff's Exhibit 23.

PHONE: WILLIAMSBURG { 5-4287
5-4288

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

February 20th, 1933.

Kalamazoo Vegetable Parchment Co.,
Parchment, Michigan

Att'n Mr. R. A. Hayward

Dear Mr. Hayward:

I am in receipt of your letter of February 9th, and I am very sorry that you were not able to go to the Convention, as I had been looking forward to meeting you in New York with a great deal of pleasure.

As per your request, I am enclosing a small sample of our Ink, together with two prints made on a hand press in our laboratory on your Basis 30 parchment stock. I would be very glad to have you put these prints thru your regular test to determine whether or not the ink meets your requirements. From experiments we have made here it seems to be quite satisfactory.

Regarding the Ink, I would suggest that in order to show how this ink will dry that you tap out a small quantity on a piece of paper and hold a lighted match under it. We have experimented with several different types of heaters and we get the best results by running the sheet over a heated cylinder, preferably steam, inasmuch as it is so much cheaper than gas and electricity. This cylinder should be twenty to thirty inches in diameter in order to get as large a surface for the paper to run over as possible, similar to the method used in Intaglio printing by the rotogravure

sections of newspapers. The ink, of course, is made to dry rapidly under heat but it will air dry in fifteen to twenty minutes, although cannot be re-wound until dry on account of offset. This applies to papers which are not waxed. If the paper is to be waxed, most any kind of stock can be used—sulphite, bond or glassine, and it is not necessary to dry the ink as it will not mix with the wax, lays well and the heat of the wax dries the ink enough so that it will finish drying in a short time thereafter.

We have made many experiments running the paper from the press directly thru the waxer which is hooked up at the other end and re-wound with very desirable results.

As explained to you before, we have been carrying on our experiments more or less in secrecy as it is not our desire to contact with everybody, and intend to offer the ink to the larger users who have the necessary heating equipment to dry same or will equip their presses with it. At the present time we are not offering this to any of your competitors, feeling that perhaps you might wish to discuss this with us if the ink meets with your requirements. Therefore, this matter will be held in abeyance until we come to some understanding with you.

The ink has a slight odor in the mass, but loses this odor practically entirely when dry.

This ink will cost about double the price for the same quality of regular inks, but our experience so far has been that it gives 35 to 50% greater coverage than ordinary ink and consequently it brings the cost back to approximately what you are now paying.

We wish to impress upon you that this is not just another printing ink, but is an entirely different process or new departure from what is ordinarily manufactured for printing purposes today.

The sample enclosed, of course, will give you some idea of how rapidly the ink dries, but a practical test will convince you that we have something which should prove of valuable interest to you.

Plaintiff's Exhibit 24.

I shall be glad to make the trip to your plant for a test whenever you advise me it is convenient.

Awaiting the favor of your further advices, I am

Very sincerely,

CALVIN DETRICK,

CD-JS

Plaintiff's Exhibit 24.

PHONE, WILLIAMSBURG { 5-4287 / 5-4288

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

March 14th, 1933

Mr. R. A. Hayward,
Kalamazoo Vegetable Parchment Co.,
Parchment, Michigan

Dear Mr. Hayward:—

We are pleased to acknowledge receipt of your letter of March 8th, and in reply, I am enclosing a small print which was made with Supercet Ink. This ink does not rub off under the wax, and I think the difficulty you experienced was probably because you rubbed it too soon after waxing. The attached sample was run thru the wax wet without a heater. We find that the ink must continue to dry after waxing at least over nite, which sets it perfectly hard. The print enclosed is very poor but is the only thing I have at the office at present and was made without any make-ready.

Plaintiff's Exhibit 24.

Supercet Ink has a slight odor before and after waxing, but you will find that this odor evaporates very quickly in the air; in fact, our experience has been that it has less odor when perfectly dry than regular printing ink. If you wish to eliminate the odor before waxing, would suggest that you run it over a heated cylinder and dry it before running it thru the wax.

As regards sending you a sample, would be glad to do so, but believe it is very necessary, to get the best results, that someone be there when you make your test, who understands this new ink and who can answer questions and explain any conditions which might arise. I wish to bring out that this is an entirely new departure from regular printing ink, and I want you to know all its possibilities. Please understand that my trip does not involve any obligations on your part, and I do not wish you to be under any disadvantage at the time you make your run. By this I do not mean that it is difficult to run the ink—quite the contrary. I find that it prints as well as any ink we have ever seen; furthermore, if there are any special difficulties which might arise in your plant I would have an opportunity to overcome them. There is no question about the ink working, as I have seen it on a full days run and experienced no printing difficulties whatsoever, but in order to show the ink up to best advantage and to determine any adjustments which might have to be made, I would like to be at your plant when the run is made.

Awaiting the favor of your further kind reply, I am

Sincerely yours,

CALVIN DETRICK

CD-JS

Plaintiff's Exhibit 25.

PHONE, WILLIAMSBURG { 5-4287
5-4288

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

March 31st, 1933

Mr. R. A. Hayward;
Kalamazoo Vegetable Parchment Co.,
Parchment, Michigan

Dear Mr. Hayward:—

I am pleased to acknowledge receipt of your letter of March 27th, together with samples of Red and Black Ink for matching purposes.

I expect to make my regular trip about the 15th of April, and which would make it possible for me to be at your plant during the week of the 17th of April. I will have enough ink with me to make a satisfactory run at that time. As soon as I know more definitely, I will advise you the exact date I will be there.

If this is not convenient for you, kindly let me know.

Sincerely yours,

CALVIN DETRICK

CD-JS

Plaintiff's Exhibit 26.

TELEGRAM — CONFIRMING COPY

From
KALAMAZOO VEGETABLE PARCHMENT CO.
KVP
Kalamazoo, Michigan

Via | Lines | Charges | Class | Time Sent | Date

May 4, 1933

To
Manufacturers Printing Ink Corporation
196-204 Wallabout Street
Brooklyn, New York

CONDITIONS MAKE IT DESIRABLE MR. DETRICH COME TUESDAY MAY NINE

RAH:HDW

R. A. HAYWARD

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

May 2nd, 1933

Mr. R. A. Hayward,
Kalamazoo Vegetable Parchment Co.,
Parchment, Michigan

Dear Sir:—

In response to your telegram received yesterday, beg to advise you that our Mr. Detrick will leave New York Friday evening and arrive at Kalamazoo I believe at 10 A.M. Sat-

Plaintiff's Exhibit 27.

urday morning, the 6th inst. He will go directly to your office.

Thanking you kindly in advance for any courtesy shown him at that time, we remain

Very truly yours,

MANUFACTURERS PRINTING INK CORP'N

H. T. WINCHELL,
Treas.

HTW-JS

Plaintiff's Exhibit 27.

Order, dated May 26, 1933.

(Opposite [illegible])

knowledged

Ship 193

ver to ink dept.

Charge to wax print

ify

PURCHASE ORDER
PURCHASING DEPT. COPY

P. ase Order Number

Use this number on Invoice and Package and in Correspondence **No. 78377**

Requisition No.

Department

Stores or Div.

Date May 26, 1939

Shipped Via

Date Shipped

Ship When

F. O. B.

TO

Manufacturers Printing Ink Co.
196-204 Wallabout St.
Brooklyn, N.Y.

Ship Via

Terms

QUANTITY ORDERED	DESCRIPTION	PRICE	PER	MEMO.
200#	Heinz yellow @ .90	6/6		6/19
65#	" blue @ 1.05			
6#	" red @ 1.15			
	Blue must trap over yellow			
	Inks must be so that small printing will not fill			
	Must match wet samples inclosed exactly			
	This is very particular job			Inv. Passed for Discount
	Samples of printing inclosed			Date
	Advise when inks will be delivered so can arrange press for trial run			Amt
	EXHIBIT U. S. Dist. Court S. D. of N. Y. JAN 19 1943.			
		A. H. Fitzgerald		

DOCKET DIVISION MAY 19 1939

753

Plaintiff's Exhibit 28.

MANUFACTURERS PRINTING INK CORPORATION
Printing and Lithographing Inks
Dry Colors and Varnishes
196-204 Wallabout Street
Brooklyn, N. Y.

June 2nd, 1933

Mr. R. A. Hayward,
Kalamazoo Vegetable Parchment Co.,
Parchment, Mich.

Dear Mr. Hayward:—

Referring to our telephone conversation this morning and confirming wire, the inks are being shipped today in a Detroit car which arrives in Detroit on Monday morning. They should then arrive in Kalamazoo Tuesday morning.

As explained to you on the 'phone, I expect to be up North the first of the week and believe I can be in Kalamazoo on Wednesday of next week, June 7th. If you can have the job ready to run at that time, it will work in with my plans very nicely.

If this will not be convenient for you, will you notify our office by wire on Monday so that they can get in touch with me.

Very sincerely,

CALVIN DETRICK.

CD

Plaintiff's Exhibit 33.

Patent No. 1,460,391.

(*Opposite* ☞)

July 3, 1923. 1,460,391

S. SATENSTEIN

METHOD OF STAMPING BOOKBINDINGS AND THE LIKE

Filed March 29, 1922

Fig. 1,

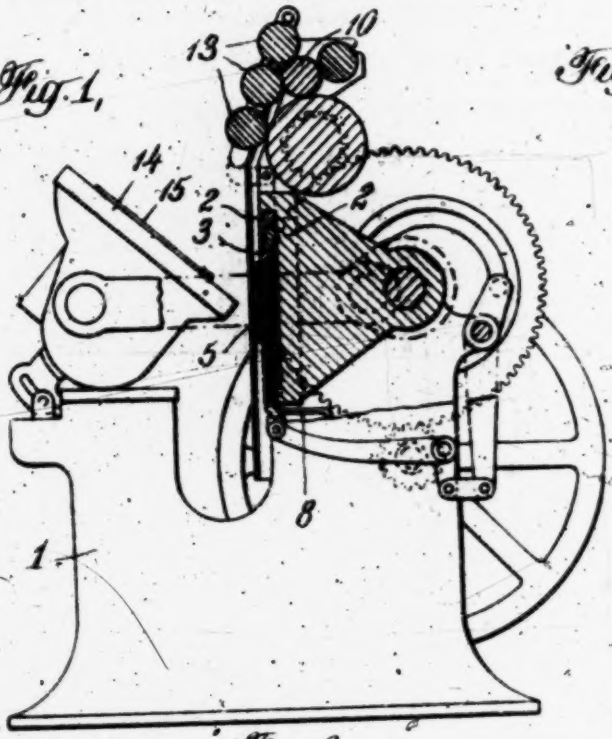


Fig. 3,

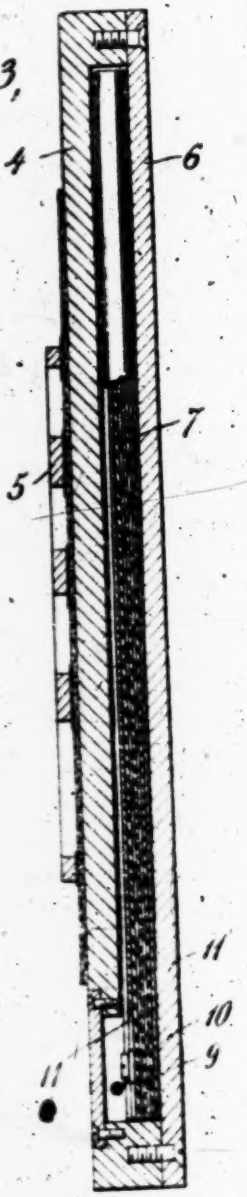


Fig. 2,

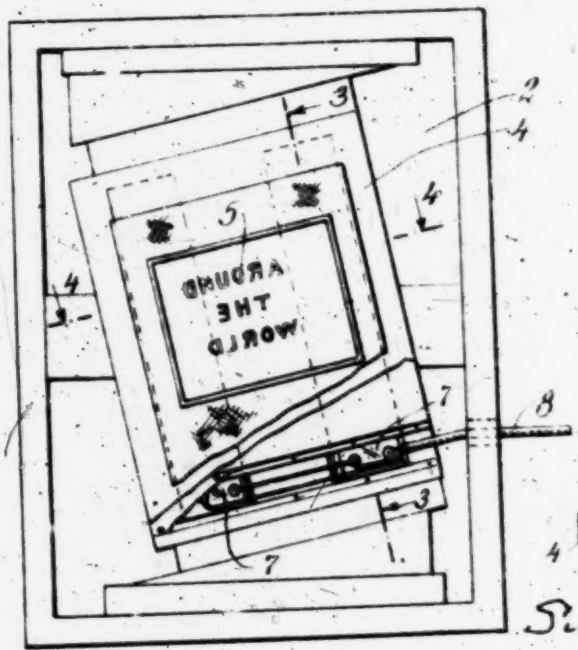


Fig. 4,



Inventor:
Sidney Satenstein
By his Attorneys
Penne Davis Mason & Edmonds

Patented Jul. 3, 1923. 1,460,391

UNITED STATES PATENT OFFICE.

SIDNEY SATENSTEIN, OF NEW YORK, N. Y., ASSIGNOR TO ALCHEMIC GOLD COMPANY, INC., A CORPORATION OF NEW YORK.

METHOD OF STAMPING BOOKBINDINGS AND THE LIKE.

Application filed March 29, 1922. Serial No. 547,715.

To all whom it may concern:

Be it known that I, SIDNEY SATENSTEIN, a citizen of the United States, residing at New York city, in the county of New York, State of New York, have invented certain new and useful Improvements in Methods of Stamping Bookbindings and the like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the printing or stamping of book-bindings, labels, hat bands, and generally to the application of impressions to any surface. The invention is particularly adaptable to the titling and decoration of bindings, although it is not limited to such use, and it is my intention to claim the method as described for all uses for which it may be employed.

In the preparation of bindings and the like, it has been customary heretofore to size and sometimes to oil the surface to which metallic leaf is applied and to impress the leaf by means of relief dies under relatively high pressure. Such application involves a number of separate operations. The leaf is first caused to adhere to the surface so that it covers entirely the space in which the title or decoration is to appear. The surface is passed through the press where the leaf is subjected to pressure by the die. The surface must then be brushed to remove the surplus leaf, and if this is of value, as when gold leaf is used, the fine particles must be recovered. Because of the cost of the leaf, the unavoidable waste and the complicated operations involved, the application of titles and decorations to bindings and the like in the manner described is relatively expensive.

It is the object of the present invention to provide a method of applying titles and decorations to bindings and the like, using metallic pigment inks as the medium of application and thus avoiding the several operations and the waste incident to the use of metallic leaf.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following specification in which the preferred embodiment of the invention is described.

I have discovered that metallic pigment inks may be successfully employed in stamping book-bindings and the like provided the plate die or type employed in the stamping operation is heated to and maintained at a suitable temperature during the printing or stamping operation. By applying heat to the printing plate in this manner the ink is caused to dry rapidly so that a clean impression is obtained which does not become blurred either in the printing or stamping operation or subsequently in the handling of the bindings. Furthermore, the rapid drying of the ink insures a smooth, hard and glossy finish on the pigment, which brings out the color and materially adds to the decorative quality of the product. The use of heat also obviates the necessity of preliminary blanking impressions in the treatment of cloth and leather having a distinct pattern or grain.

In carrying out the invention, it is desirable to utilize an ink which is capable of drying without becoming gummy and of a consistency such as to permit transference of the ink through the printing rolls to the printing plate. It is desirable, moreover, that the vehicle employed in the ink be such as to protect the pigment from oxidation and consequent discoloration. Such an ink is disclosed in the copending application of Howard Waters Doughty, Serial No. 521,169, and consists, in accordance with the disclosure in that application, of a metallic pigment suspended in a vehicle which comprises a resinous substance and a high boiling hydrocarbon derivative as a solvent for the resinous substance. In its preferred embodiment, the vehicle consists of ordinary rosin dissolved in terpineol or a solvent containing terpineol in the proportion of seven parts by weight of terpineol to two parts of ordinary rosin. The proportions of the ingredients of the solvent may vary widely as may also the particular ingredients employed. The metallic pigment, which may be, for example, a bronze powder in finely divided condition, is mixed with the vehicle in proportions to produce an ink of the desired consistency, for example, in equal proportions by weight or in the proportion of two parts by weight of the pigment to one part by weight of the vehicle. These proportions may also vary depending upon the

particular characteristics of the vehicle and pigment employed. No claim is made herein to the ink or vehicle, this being the subject matter of the copending application referred to, and it is to be understood, moreover, that the present invention is not limited to the use of the specific ink mentioned, this being merely by way of illustration of the preferred embodiment of the invention.

I have discovered that the best results are obtained when the ink above described is transferred to the binding or other surface by a printing plate which is preferably heated to a temperature sufficient to dry the ink during the impression interval. A temperature of approximately 140° F. is satisfactory with the particular ink described. The temperature of the plate may vary considerably, depending upon the composition of the ink, without materially affecting the results obtained. It is preferably maintained at a substantially uniform temperature, and this may be readily accomplished by the use of electric heating elements arranged behind the plate in heat-transmitting relation thereto.

In carrying out the invention a printing press of the ordinary swinging platen type or an upright stamping or embossing press with an inking attachment may be employed. The heated printing or stamping plate die or type is supported on the bed of the press, and the heating elements therein are connected to a source of electric current whereby the desired temperature is maintained. The ink is preferably applied by inking rollers which are not affected by the heat. Rollers of vulcanized oil or rubber are satisfactory for this purpose. The rollers are fed from a suitable fountain plate or roll regulated to supply ink as required to the inking rolls. The inking rolls travel over the printing or stamping plate between each impression applying ink thereto. The ink is immediately transferred to the binding which is disposed by the operator upon the swinging platen. Because of the temperature of the plate, the ink is substantially dry before the pressure is released. The operation involved is thus quite as simple as any ordinary printing operation, the titles and decorations being complete when the surface is withdrawn from the press by the operator following the impression. Of course, the bindings may remain in the press for one or more impressions as desired, but in ordinary work it is sufficient to apply a single impression.

In order that the invention may be clearly understood, I have shown in the accompanying drawing the means whereby it may be carried out, it being understood, however, that the invention is not limited to the particular apparatus disclosed, nor, in fact, to any special mechanisms or devices. In the drawing,

Fig. 1 illustrates in vertical section a printing press suitable for use in stamping book bindings;

Fig. 2 is a plan view partially in section of the printing plate and heating means therefor;

Fig. 3 is an enlarged sectional view on the line 3—3 of Fig. 2; and

Fig. 4 is a reduced sectional view on the line 4—4 of Fig. 2.

Referring to the drawing, 1 indicates the frame of the press which is provided with a bed 2 to receive the heated plate 3. The latter comprises a base 4 to which a printing plate 5 may be secured, and cover plate 6. Heating elements 7 are supported within the base 4 and are connected by conductors 8 to a source of current. The heating elements may be of any suitable construction, consisting, for example, of sheets 9, preferably of mica, upon which resistance conductors 10 are wound. The resistance conductors are insulated from the base 4 and cover 5 by insulators, such as sheets of mica 11. Other forms of heating elements may be used. The press is provided with a fountain roller 12 to which the ink may be applied, and inking rollers 13 travel as is usual in printing presses between the fountain roller and the printing plate, thus serving to transfer the ink after each impression to the printing plate.

A swinging platen 14, adapted to be actuated in the usual manner, is provided, and the binding or other surface 15 to be stamped is placed upon the platen as the latter swings downwardly. The binding is then carried upwardly into contact with the printing plate to receive the impression, after which the platen returns and the binding is removed by the operator.

From the foregoing, it will be understood that I have devised a novel method of stamping surfaces such as book-bindings, labels, hat-bands and the like. By the application of this method the tedious process of stamping involving the use of metallic leaf is entirely avoided; the time required to complete the stamping is materially reduced and waste of material, which is unavoidable in the use of metallic leaf, is eliminated. The invention is particularly adapted to the preparation of bindings in large editions where frequently the cost of binding must be reduced to a minimum. Bindings prepared in accordance with the invention closely resemble those prepared by the application of metal leaf, and, in fact, can hardly be distinguished if the pigment employed in the ink is in a sufficiently finely divided condition.

Various changes may be made in the de-

tails of the operation without departing from the invention or sacrificing any of the advantages thereof.

I claim:

A method of stamping which comprises transferring a metallic pigment ink containing a solvent which is not volatile at atmospheric temperatures by pressure to a surface and drying the ink on the surface during the impression interval by the application of sufficient heat to ensure volatilization of the solvent.

In testimony whereof I affix my signature.

SIDNEY SATENSTEIN.

Plaintiff's Exhibit 49 for Identification.

Distillation Range of 1922 Kerosene.

First drop	175°C
5%	191.5
10	197
20	203
30	210
40	216.5
50	224
60	233
70	245
80	268
90	307
95	324
End Point	329

Plaintiff's Exhibit 52.

Distillation Range of Defendant's Kerosene.

First drop	174°C
5%	191.5
10	197.3
20	209
30	215.3
40	220.5
50	226
60	230.7
70	236.8
80	244
90	255
95	264
End Point	270

Plaintiff's Exhibit 53.

Comparison of Formulas.

INK VEHICLE

(For Yellow, D. Ex. G-2; Red, D. Ex. H-2; Black, D. Ex. J-2)

McElroy Patent p. 2, ll. 16-27			Carroll Formulae D. Ex. F-2
Terpineol	79.8	14.3	Terpineol
Rosin oil	4.2	28.6	Pale second run rosin oil
Powdered Cumar	16.	57.1	Cumar P25 [viscous]
	100.0	100.0	

VEHICHLE FOR BLUE INK

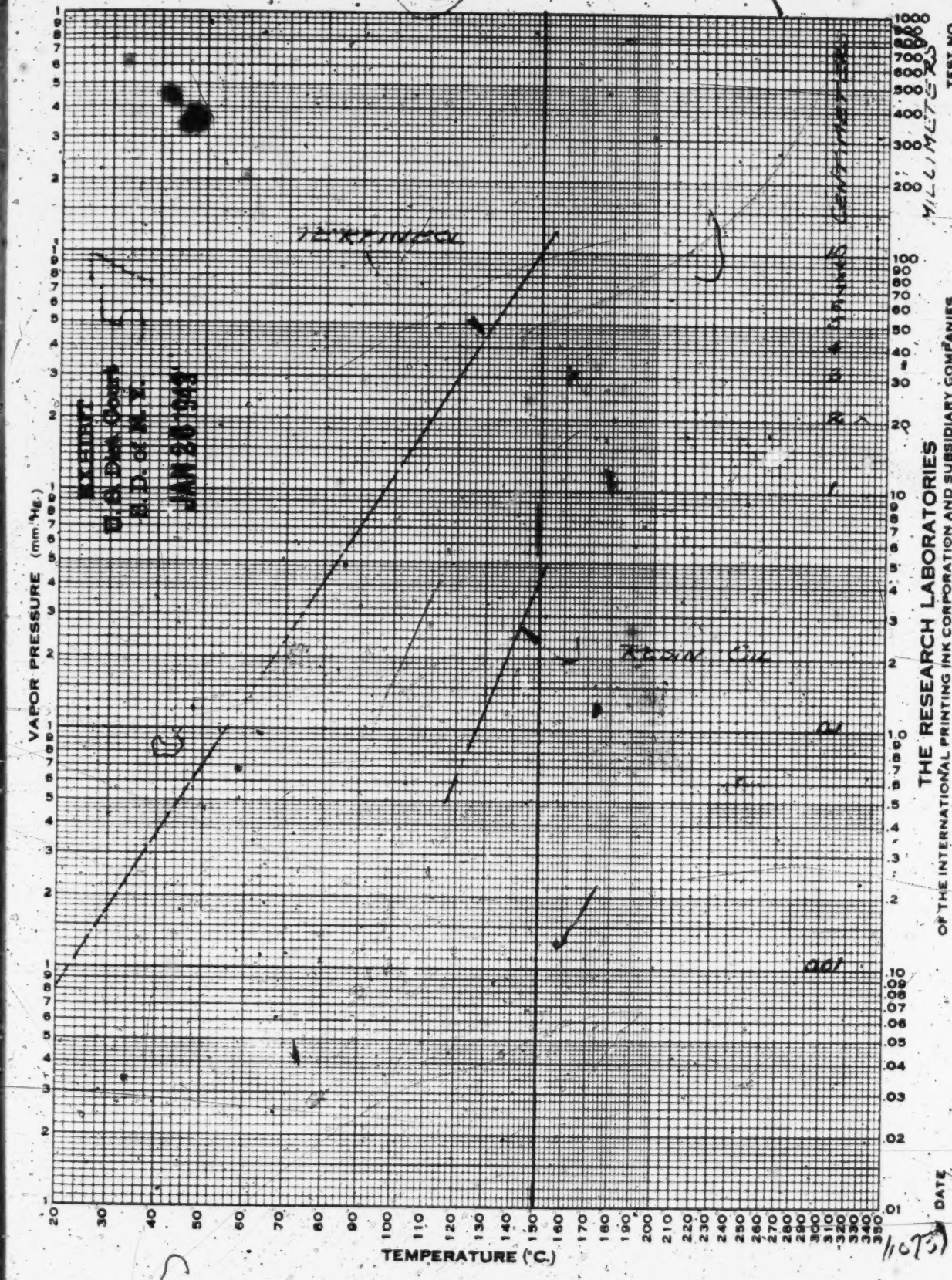
McElroy Patent p. 2, ll. 16-27			Carroll Formulae D. Exs. F-2, J-2
Terpineol	79.8	15.7	Terpineol
Rosin oil	4.2	29.5	Pale second run rosin oil
Powdered Cumar	16.	54.8	Cumar P25 [viscous]
	100.0	100.0	

Plaintiff's Exhibit 57.

Chart.

(*Opposite* ☞)

Exhibit 57 (12)



Plaintiff's Exhibit 59.

The following is a breakdown of the Jirousek Patent U. S. No. 1,954,627 into the essentjal ingredients on 100% basis:

Pigment		23.6%
Solvent		21.2%
Benzyl Alcohol	8.4%	
Mineral Spirits	9.3%	
Kerosene	3.5%	
Resin		1.6%
Copal	1.6%	
Kauri	Trace	
Solid		2.4%
Paraffin Wax	1.6%	
Petrolatum	.8%	
Liquid		51.2%
Rosin Oil	1.7%	
Drier	9.4%	
Cobalt Drier	2.6%	
Vegetable Drier	6.8%	
Linseed Oil	40.1%	

Plaintiff's Exhibit 63.

Zinsser & Co., Inc.
Manufacturing Chemists
Hastings-on-Hudson, N. Y.

February 17, 1932

Mr. H. Finne
Cray-Finne Company, Inc.
310 East 22nd Street
New York City

My dear Mr. Finne:—

I have sent you a package containing a tin can full of dispersed Chrome Yellow Medium in the proportion of 10 parts of Chrome Yellow Medium to two parts of a mixture consisting of equal parts of Blown Castor Oil and Di Butyl Phthalate. A second tin can contains a special varnish made for you according to our original sample, 842-C-V.

The original sample given you was an ink made of this Yellow and this varnish. In this case we prefer to give you the Yellow and the varnish separately. If you will grind 10 parts of the Yellow and 7½ parts of the varnish, you will obtain the same consistency and the same ink as the original sample, 842-C-V.

In the package is also enclosed a bottle of special thinner. Should you find your ink or your varnish too heavy, use this thinner according to your own judgment.

Should you have any trouble with these materials, please call me up and I will give you all the assistance I am able to to solve this problem.

With kindest personal regards, I am,

Very truly yours,

A. E. Gessler

A. E. Gessler M. F.

AEG:MF

Plaintiff's Exhibit 64.

April 4, 1932.

Amendment to Description of July 8, 1930.

The present invention relates to Printing Inks in which the oxidizing oil of the ordinary type of Printing Ink is replaced by a mixture of plasticizers and Nitrocellulose or gum solutions in such a way that the end product can be used on the printing press without drying on the rollers, but yet will dry in the prints.

Heretofore Printing Inks were made by grinding pigments in oils or varnishes which had the ability to dry slowly in the air by oxidizing. This process of oxidizing is unsatisfactory for many purposes because the drying of the print is too slow causing trouble thereby, extra operations and delay on high speed printing presses and also because the dry film remains soft for a long time and does not protect the pigment sufficiently against rubbing or moisture or chemical influences, possesses a disagreeable odor and other unsatisfactory qualities.

I have discovered that by grinding or dispersing pigments in plasticizers and oils, or both, and by mixing these dispersions with solutions of Nitrocellulose or gums in organic solvents possessing a vapor pressure as low or lower than a few tenths of one millimeter of Mercury at 20° C, but yet volatile enough to evaporate quickly from the thin layer of the print if exposed to heat, a very satisfactory ink can be obtained. The drying of this ink is slow enough so that it does not harden or thicken on the printing rollers, but notwithstanding this, will dry quick enough if exposed to heat after being printed, by the evaporation of the solvents out of the very thin layer, leaving a very flexible film in which the pigment is much better protected against rubbing or moisture or chemical influences and which possesses practically no odor.

Inks of this character have not been considered possible or practical so far, since the formulae used in the lacquer industry are not suitable at all on account of the high volatility of the solvents employed. Such inks would dry very

Plaintiff's Exhibit 64.

quickly on the printing rollers and make continuous printing impossible. Experiments have been made to remedy this, but the essential point was not understood, namely, that such solvents must be used which possess low vapor pressures of less than a few tenths of one millimeter of Mercury at ordinary temperature but yet are volatile enough to evaporate quickly from the thin film of the print if exposed to heat for a short time.

I give the following example as an illustration of one method of applying the invention: 100 parts of Chrome Yellow are ground or chemically dispersed in a mixture of 10 parts of Blown Castor Oil and 10 parts of Di Butyl Phthalate. The obtained semi-soft product is then mixed or ground with a solution of 35 parts of Nitrocellulose in 55 parts of Diethylene Glycol Butylether. The resulting product is a Printing Ink of excellent printing quality, practically non-drying on the roller but yet drying out from the thin film of the print within a few seconds if exposed to heat, as for instance, by passing over a steam heated roller.

What I claim is: As a new article of commerce a Printing Ink consisting of a pigment or pigments, ground or dispersed in oils or other plasticizers, in mixture with solutions of Nitrocellulose and or gums in solvents possessing vapor pressures of a few tenths of one millimeter Mercury at 20° but yet quickly volatilizing out of the thin layer of the print if exposed to heat for a short time.

County of Westchester, } ALBERT E. GESSLER.
State of New York. }

Subscribed and sworn to before me
this 9th day of April, 1932.

R. A. Neely
Notary Public (Seal)
Westchester Co., N. Y.
My Commission Expires
March 30, 1934

Plaintiff's Exhibit 65.

Description of July 8, 1930.

The present invention relates to Inks for paper, tin, and calico printing, etc., in which the oxidizing oil of the ordinary printing ink is replaced by a mixture of plasticisers and nitrocellulose or gum solutions in such a way that the end product can be used on the printing press without drying on the rollers, but yet will dry in the prints.

Heretofore printing inks were made by grinding pigments in oils or varnishes which dried slowly on the air by oxidizing. This process of oxidizing is naturally a slow one and is unsatisfactory for many purposes because the dry film remains soft for a long time and does not protect the pigment sufficiently against rubbing or moisture or chemical influences and possesses a disagreeable odor and other unsatisfactory qualities.

I have discovered that by grinding or dispersing pigments in plasticisers and oils, or both, and by mixing these dispersions with thick solutions of nitrocellulose or gums in organic solvents of a very low vapor pressure, preferably less than 1 mm Hg at 20° C, but yet still volatile at ordinary temperature, a very satisfactory Ink can be obtained whose drying is slow enough that it does not harden or thicken on the printing rollers, but notwithstanding will dry quick enough when printed on paper or tin or textiles by the evaporation of the solvents out of the very thin layer, leaving a very flexible film in which the pigment is much better protected to rubbing or moisture or chemical influences and which possesses practically no odor.

Inks of this character have not been considered possible or practical so far, since the mixtures used in the lacquer industry are not suitable at all on account of the high volatility of the solvents employed. Such inks will dry very quickly on the printing rollers and make continuous printing impossible. Experiments have been made to remedy this but the essential point was not understood that solvents must be used which possess the low evaporation of less than

Plaintiff's Exhibit 65.

1 mm Hg vapor pressure at ordinary temperature, but yet are volatile enough to evaporate in a reasonable time if spread in the thin film of a print.

I give the following example as illustration of one method of applying the invention.

100 parts of Chrome Yellow are ground or chemically dispersed in a mixture of 10 parts of Blown Castor Oil and 10 parts of Di Butyl Phthallate. The obtained semi soft product is then mixed or ground with a solution of 35 parts of ¼ second nitro cellulose in 55 parts of Butylcarbitol. The resulting product is a printing ink of excellent printing qualities, practically none drying on the roller but drying on paper within an hour.

What I claim is: As a new article of commerce a printing ink consisting of a pigment or pigments ground or dispersed in oils or other plasticisers, in mixture with solutions of nitro cellulose or gums in solvents possessing vapor pressure of less than 1 mm Hg 20° C, but yet still volatile at ordinary temperature.

A. GESSLER

(SEAL)

July 8 1930.

Witness as to signature
July 8th 1930

FRED J. CONGLETON

Defendant's Exhibit B.

Mr. Frank W. Cray, President
Cray-Finne Company
310 East 22nd Street
New York City

Dear Mr. Cray:

On March 26, 1934, we received 386 pounds of 9816 ink. The sample lot of this ink run previously appeared to work satisfactorily. However, when we attempted to run this shipment it dried on the rollers and could not be used.

We returned 364 pounds on April 17th at your request in order that you could make the necessary adjustments to permit our running the ink.

On April 24th you returned 391 pounds and we put it on press yesterday. At 3500 we cracked one set of rollers; we put in a new set and at 35,000 this set cracked on us.

Inasmuch as we all agreed that we should not proceed with further experiments on this type of ink, it will perhaps be better for us to return the balance of this ink to you as you previously suggested that you could put it to other use. If this is satisfactory to you, will you please issue the necessary credit.

Very truly yours,

Assistant to Superintendent

May first
1 9 3 4
AES:A

Returned 372 lbs on May 3rd.

Defendant's Exhibit C.

Gessler U. S. Patent No. 2,128,672.

(*Opposite* ☞)

Patented Aug. 30, 1938 2,128,672

UNITED STATES PATENT OFFICE

2,128,672

PRINTING INK

Albert E. Geigler, Yonkers, N. Y., assignor, by mesne assignments, to Interchemical Corporation, Cincinnati, Ohio, a corporation of Ohio

No Drawing. Application March 17, 1934, Serial No. 716,178

1 Claim. (Cl. 134—35)

In my co-pending application Serial No. 622,453, filed July 14, 1932, Patent No. 2,087,190, issued July 13, 1937, I have described and claimed a printing ink, unusual characteristics and adaptabilities comprising a coloring material incorporated in a vehicle which is practically non-volatile at approximately room temperatures but which is highly volatile, or whose vapor pressure increases very rapidly, at elevated temperatures. The preferred vehicles described and claimed in the aforementioned application are those containing solvents which possess physical properties like those characteristic of diethylene gycol monobutyl ether, which not only impart to the ink superior printing qualities but which, when the prints are subjected to heat, cause them to dry almost instantaneously.

Such vehicles as are above described have the advantage that they may be formed into inks which can be handled with facility and which are so free from highly volatile solvents that they do not dry at room temperatures or on the printing plates or in the fountain of the press, but which will dry so quickly when subjected to elevated temperatures that prints made from them are dry as soon as they have passed through the drying apparatus at the delivery end of the printing machine on which they are used. This, of course, results in large savings in time, labor, power and equipment as it enables the prints to be printed immediately on the reverse side and to be packed and shipped without the necessity of the storing and drying operations usually required after the prints have been made. Successive sheets of material will not offset or stick together because each ink film dries practically instantaneously. Thus, there can be no smudging due to the wetness of the print.

The superior printing qualities of inks formed from such vehicles are undoubtedly due to the excellent characteristics of viscosity, tack, covering power, resistance to absorption, etc., which are imparted to the inks by the solvents and other materials used. These enable less ink to be used for a given coverage than is the case with ordinary ink, due to the fact that the ink is non-absorbent, and cause the elimination of "halo", which is a term used in the printing industry to characterize the tendency of an ink to move outwardly from the point at which it has been applied, and thus form irregular markings upon the surface printed upon.

Many printing presses, and especially those used for fine printing, are equipped with a very sensitive type of ink-distributing rollers, carrying the ink from the fountain to the printing plates and consisting generally of mixtures of glue, glycerine and water or similar materials. If these rollers are used with the printing ink of my said co-pending application, they are subject to deterioration by reason of the tendency of the ink to extract some of their constituent substances. This is explained by the fact that the solvents used in the preparation of the ink are miscible with water and/or gylcerine or glycerine substitutes, and during their use with such ink-distributing rollers a slow extraction or exchange of these substances from the roller material takes place and the rollers eventually are rendered hard and inelastic and unable to carry and distribute the ink evenly and satisfactorily over the printing plates.

It will be apparent that the full benefits and advantages of the printing ink described and claimed in my aforesaid application cannot be availed of on presses equipped with ink-bearing rollers of the type referred to. It is, therefore, an object of the present invention to prepare an ink which is adapted for use with rollers made from glue, water and glycerine or similar mixtures.

With ink-bearing rollers of this type, therefore, I have found it advantageous to use an ink which will not extract substances from them, particularly water, glycerine, or its substitutes. In order to assure this, it is important that the solvents employed in the ink should be such that they inherently have a limited affinity for water, glycerine or glycerine substitutes. Then by small additions of these substances, the remaining demands of the ink for them may be satisfied. With such an ink substantially no water or glycerine will be taken up from the rollers. The amount of such additions should, however, not be so great as to disturb the printing qualities of the ink nor will such excess addition be necessary where the proper solvent is employed.

I have found that certain organic esters possess these desirable qualities, and are quite satisfactory for use as solvents in vehicles for the printing inks required for such ink-bearing rollers or contact bodies as are above described. For instance, diethylene glycol monobutyl ether, which is a solvent particularly well adapted to dissolve certain low viscosity cellulose compounds such as nitrocellulose, or natural or synthetic resins, if converted into its esters—for example, its acetate—will have these qualities, yet the resultant compound possesses vapor pressure and other desirable characteristics very similar to those pos-

sessed by the original ether, and enables the same great advantages to be obtained when used as a solvent in the preparation of a printing ink.

It should be understood that for the purposes of the present invention, all those solvents of soluble cellulose compounds and resins are included which have similar chemical and physical properties as the above described ester.

It should be noted that the water, glycerine, etc., or mixtures of substances which when extracted from a roller of the type described will render it unfit for use, is in amount relatively small as compared with the total composition of the roller, and the deleterious effect is apparently due to the removal of these substances at the surface. Consequently, if the ink possesses even a slight affinity for these substances they will be slowly extracted from the surface of the rollers and a gradual hardening of the rollers will take place. It will be seen, therefore, that the ideal condition to be obtained is one wherein there is an exact balance between the desire of the ink to take up these substances and the amount thereof which are supplied to satisfy this desire.

Inks containing organic solvents of this character have the same qualities and novel features in general as the inks described and claimed in application Serial No. 622,453, improved by the additional quality and feature of not attacking and unduly destroying the sensitive ink-bearing rollers of the type referred to.

As a specific example of the preparation of my novel ink, the following is given:

35 parts of low viscosity nitrocellulose are dissolved in 55 parts of monobutyl ether of diethylene glycol acetate and 10 parts of dibutyl phthalate. This solution may be heated to drive off impurities, and a small amount, say 1%, of water and glycerine added. The ink is then prepared by grinding or otherwise dispersing a pigment, such as 100 parts of chrome yellow, in the solution. It will, of course, be recognised that the yellow pigment may be replaced by any suitable pigments or dyestuffs and/or mixtures thereof; that the binder, nitrocellulose, may be replaced by other binders, such as other cellulose compounds and/or mixtures thereof and/or by natural or synthetic resins. Moreover, the dibutyl phthalate may be replaced by any other suitable agent, such as tricresyl phosphate or the like, effective to prevent brittleness in the finished product and to repress the vapor pressure of the solvent media at room temperatures. If desired, 10 parts of castor oil may be added to the vehicle in order to give softness and flexibility to the ink coating. The monobutyl ether of diethylene glycol acetate may be replaced by other solvents, or solvent mixtures, possessing a similarly low rate of evaporation at ordinary temperature and a marked acceleration of the volatility at raised temperatures, and possessing a similar substantial lack of affinity for water and/or glycerine, or glycerine substitutes.

One important property of diethylene glycol monobutyl ether acetate is its vapor pressure characteristic. The vapor pressure of this solvent at 20° C. is similar to, and even less than, that of diethylene glycol monobutyl ether, the solvent specified in applicant's first application (that is to say, it is less than 0.02 mm. of mercury, according to Brewer and Gardner, Industrial and Engineering Chemistry, vol. 29, No. 2, p. 179, February, 1937), and its vapor pressure at 150° C. approximates the vapor pressure of ethyl alcohol at ordinary temperatures (about 40.0 mm. of mercury). This vapor pressure at elevated temperatures contrasts sharply with the vapor pressures of high boiling "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific example. The vapor pressure of this liquid (according to Brewer and Gardner) is 0.45 mm. at 100° C. and 1.4 mm. at 150° C.

Another important property of diethylene glycol monobutyl ether acetate is its substantial lack of affinity for water and glycerine, which distinguishes it not only from hygroscopic organic solvents, but also from those which, while not truly hygroscopic, are water-miscible. Otherwise, the present ink is similar to the ink of my co-pending patent referred to above. It has the consistency of ordinary oil varnish printing ink, is stable on the press, and yet dries instantly when heated following the printing operation.

It will be seen that an ink made in accordance with the principles hereinbefore set forth is distinctly superior to the ordinary types of inks made by grinding pigments in the usual types of oils or oil varnishes. Such oils or varnishes are characterized by their relatively slow rate of drying due to polymerisation, oxidation and/or absorption and as a consequence cause considerable difficulty in printing processes by delaying the speed of operation.

It will also be noted that the quick drying ink of the present invention is distinct from and superior to the ordinary type of oil ink in which the driers or drying accelerators are incorporated, as the usual accelerating means are not sufficiently rapid in accomplishing the desired result of instantaneous drying. The ink of the present invention, moreover, is not to be confused with lacquers as the latter have the predominant characteristic of high volatility at room temperatures (due to the highly volatile solvents employed) as contrasted with the substantially non-drying nature of my novel ink at room temperatures; and such lacquers also lack the qualities of tack and viscosity, characteristic of printing ink, possessed by my ink, because they employ solutions of relatively low solids concentration as contrasted with the relatively high solids concentration of my ink.

It will be noted further that substances like dibutyl phthalate referred to in the above example, are desirable not only because of their capacity for dissolving cellulose compounds but also because of their tendency to prevent the brittleness characteristic of a film consisting of nitrocellulose or resins alone. This type of solvent possesses a very low vapor pressure over a wide range of temperature and is practically non-volatile if exposed to the heat necessary for the process. It will be seen, therefore, that this type of solvent is desirable as an aid to plasticising the film obtained after the main solvent has evaporated. Furthermore, as above indicated, such solvents have a negligible vapor pressure at ordinary temperatures and at the same time exert a repressing action on the other solvents and may be admixed with such other solvents in order to reduce or repress the normal vapor pressures of such other solvents at room temperature. Thus, the dibutyl phthalate referred to in the example as illustrative, or other plasticisers such as tricresyl phosphate, triacetine, castor oil or the like, will be seen to be of considerable importance by reason of the fact that their characteristically low vapor pressures at ordinary temperature (these solvents have no appreciable vapor pressure at room temperature) make them admirably suited for intermixture

in proper proportions with solvents whose vapor pressures at room temperature may be somewhat higher than would ordinarily qualify them for use alone as solvents in my novel printing ink; and the rate of evaporation of the mixture may thus be regulated so that it falls within the preferred range indicated.

By "room temperatures" as used in this specification, I mean the ordinary or normal temperatures of a room in which people live and work. This is generally agreed to be temperatures from approximately 20° C. to approximately 25° C.

With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, by means of suitable drying equipment, to sufficient heat to dry the thin film of the print very rapidly. Thus, a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use. Coating the prints with paraffin or similar compounds, in order to enable them to be immediately printed on their reverse side, and the disadvantages concomitant therewith, are eliminated by the process of this invention.

The novel ink and process described above are not only capable of utilization in printing upon paper, but they are also adapted for use in making very satisfactory prints upon many other surfaces, such as, for instance, textiles or metallic surfaces, or the lacquered surfaces of Cellophane, or the like.

It is apparent that such an ink as has been described does not necessitate the admixture of driers, does not set or harden on the printing rollers or plates, but is yet capable of being dried very quickly when subjected to suitable temperatures after being printed, by the evaporation of the solvent from the thin layer of the print. The finished products are flexible prints in which the pigment is well protected against being rubbed off. They are not softened by moisture, grease, or most chemical influences and possess practically no odor.

What I claim is:

A printing ink adapted for printing presses having rollers of the glue, glycerine and water type, which is substantially non-drying on the press at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary printing ink, in which the major part of the liquid component is diethylene glycol monobutyl ether acetate.

ALBERT E. GESSLER.

Defendant's Exhibit E.

File History of Patent No. 2,087,190

(Opposite ☞)

Defendant's Exhibit E.

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

To all persons to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the records of this office of the File Wrapper and Contents, in the matter of the

Letters Patent of
Albert E. Cessler, assignor,
by mesne assignments, to
The International Printing Ink Corporation,

Number 2,087,190, Granted July 13, 1937,

for

Improvement in Printing Inks.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington, this eighth day of August, in the year of our Lord one thousand nine hundred and forty-one and of the Independence of the United States of America the one hundred and sixty-sixth.

ATTEST:

Chief of Division.

Commissioner of Patents.

Defendant's Exhibit E.

PATENTED [redacted]

PATENT NO. 2087196

RETURN TO RECORD ROOM [redacted]

022453

DATED JUL 13 1937

DIV. 5064

(EX'R'S BOOK) 86-9

Name ALBERT E. GESSLER

Assignor of [illegible] to The International Printing Ink Corporation of New York, N.Y., a corp. of Del.

of YONKERS

State of NEW YORK

Invention PRINTING INK AND METHOD OF UTILIZING SAME

SPECIAL

CASE PENDING OVER 3 YEARS

ORIGINAL	RENEWED
APPLICATION FILED COMPLETE JULY 14, 1932	JUN 11 1936
Petition, Specification, Oath, First Fee $25, 1 sheets Drawings. JULY 14, 1932	$30. JUN 11 1936

Examined and passed for Issue [illegible], 1933
Exr. Div. 64

Notice of Allowance [illegible], 193
Final Fee [illegible], 193

Reexam'd and passed for Issue June 3, 1936
Exr. Div. 64
JUN 1937
Notice of Allowance [illegible], 193
Final Fee $30 June 7, 1937

Attorney CHARLES J. HOLLAND 420 LEXINGTON AVE NEW YORK N.Y.
Robert W. Byerly 225 Broadway
Associate Attorney [illegible]

No. of Claims Allowed 8 Print Claim 1 in O. G. Class 134-36

Title as Allowed Printing Ink.

Filed [illegible], 19

Division of Agr., Pat.

Defendant's Exhibit E.

JUL 14 32

MAIL DIVISION
JUL 14 32
PATENT OFFICE

GRAYBAR BUILDING
EASTERN CONCOURSE-GRAND CENTRAL TERMINAL
NEW YORK CITY

July 13,1932.

Hon. Commissioner of Patents,
Washington, D. C.

S i r : -

Enclosed please find application of Albert E. Gessler for patent for Printing Ink and Method of Utilizing Same, comprising petition with power of attorney, specification and claims, oath, and check for $25 Government filing fee.

Please file this application in the Patent Office and act on the merits of same in due course.

Respectfully,

Charles J. Holland

M

622453

MAILED
JUL 14 32

62,253

PETITION.

TO THE COMMISSIONER OF PATENTS:

Your petitioner, ALBERT E. GEBELEIN, a citizen of the United States, residing in the City of Yonkers, County of Westchester and State of New York, whose post-office address is No. 8 Hillcrest Avenue, Yonkers, N. Y., prays that Letters Patent may be granted to him as sole inventor for Improvements in PRINTING INK AND METHOD OF UTILIZING SAME- set forth in the annexed specification; and he hereby appoints CHARLES J. HOLLAND, Reg. No. 11,545, of No. 420 Lexington Avenue, New York, N.Y., his attorney, with full power of substitution and revocation, to prosecute this application, to make alterations and amendments therein, to receive the patent and to transact all business in the Patent Office connected therewith.

Signed at the City, County and State of New York, this 25th day of June, 1932.

Albert E Gebelein

SPECIFICATION.

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN that I, ALBERT E. GEBELEIN, a citizen of the United States, residing at Yonkers in the County of Westchester, State of New York, have invented certain new and useful improvements in PRINTING INK and METHOD OF UTILIZING SAME, of which the following is a full, clear and exact specification:

1/2

62,253

Defendant's Exhibit E.

The present invention relates to printing inks and has for an object the preparation of a novel type of printing ink, which possesses many advantages over the printing inks heretofore known and overcomes many of the disadvantages associated with the procedure which it has been necessary to use in order that such inks may be properly applied to produce a satisfactory print.

Heretofore, printing inks have in general been made by grinding pigments in oils or oil-varnishes, or both. Such oils or varnishes have been characterized by their relatively slow rate of drying, due to polymerization, oxidation and/or absorption and, as a consequence, have presented great difficulty in printing processes by greatly delaying the speed of operation. This has not only necessitated the expense and maintenance of large and cumbersome auxiliary equipment and extra labor, but has also resulted in a dependency of the printing process upon the time required to obtain a complete drying.

In order to overcome these difficulties, it has been customary to incorporate in the inks varying amounts of driers which have the ability to accelerate the speed of the oxidation and/or polymerization of the oil varnishes. However, even with all possible acceleration, the drying of the prints takes many hours or even days, necessitating in addition to the great delay in time, extra labor to remove, to store, and to return to the machines the printed material and also in many cases a great waste of paper in the form of slip-sheets which must be rolled up or stacked between the prints in order to avoid offsetting, rubbing off, smudging or sticking together.

It has also been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers. As is well known, the cellulose solvents used in these lacquers are characterized by a high degree of volatility. Indeed, this characteristic is considered an advantage in lacquers, for in the ordinary use to which lacquers are put,

rapid drying or hardening is highly desirable. However, it is obvious that such rapid drying inks made on this principle unsuitable for printing from plates or rollers; for, while they may be applied to printing plates or rollers, they will quickly dry and harden thereon and they will have only the effect of yielding dry or half dry material to the printing form from which, therefore, no satisfactory impression can be made on the material to be printed.

I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided. Naturally, if the solvents are too slow in evaporating, the same difficulties, which occur in the case of ordinary oil varnish inks, are encountered. In this respect I have found that certain such high boiling solvents, very well adapted to dissolve cellulose compounds, have at room temperature such slow drying properties that, while they may be employed as solvents in this ink, and while an excellent impression may be transferred to the surface to be printed upon, the impression will nevertheless be so moist that it is likely to become blurred or smudged by rubbing after many hours or even days. This defect, however, may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit, at elevated temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while others show little change in their vapor pressures and therefore are practically non-volatile.

As above indicated, the present invention makes use of the characteristics of these solvents having high boiling points and high vapor pressures at elevated temperatures.

The referred to solutions, in contradistinction to lacquer solutions which require highly volatile solvents, are characterized by their very low rate of evaporation at temperatures approximating room temperature and by their ability to manifest a relatively high degree of

B 2263

Defendant's Exhibit E.

volatility when subjected to temperatures higher than room temperature. The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure ~~of the order of about one millimeter or less of mercury~~ at room temperature, but yet further characterized by a rapid rise in their vapor pressure curves upon elevation of the temperature, -- that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised. Among this peculiar class of solvents I have found as an example diethylene glycol monobutyl ether to be a solvent for nitrocellulose and many natural and artificial gums, very well adapted to the purposes of this invention. This solvent at room temperatures remains fluid and moist for a long period of time. When heated to about 100° C. or above, the rate of vaporization is greatly accelerated and, when used in the ink of this invention, produces a print which dries almost instantaneously when subjected to such a heat treatment.

The printing ink above briefly described may be further admixed with varying amounts of another and different class of oils or high boiling solvents possessing a very low vapor pressure over a wide range of temperatures, so that they are practically non-volatile if exposed to the heat necessary for the process. This admixture acts as a plasticizer and tends to prevent the brittle characteristic of a film consisting of nitrocellulose or gums alone.

The following specific example is illustrative of my invention as applied to the production of a yellow printing ink particularly. The ink may be made up as follows: 100 parts of chrome yellow, 35 parts of nitrocellulose (low viscosity), 55 parts of diethylene glycol ~~butylether~~, 10 parts of dibutylphthalate, and 10 parts of blown castor oil.

The above composition may, for example, be prepared by grinding or otherwise dispersing the pigment in a solution of the nitrocellulose in diethylene glycol monobutyl ether. The two other ingredients may

Defendant's Exhibit E. B 2247

be introduced in such order as may be expedient. It will, of course, be recognized that the yellow pigment may be replaced by any suitable pigments or dyestuffs and/or mixtures thereof; that the nitrocellulose may be replaced by other cellulose compounds and/or by natural or synthetic resins. Moreover, the dibutylphthalate may be replaced by any other suitable agent, effective to prevent brittleness in the finished product. Also, the blown castor oil which has been included in the specific formula given may be replaced by other suitable materials. Diethylene glycol butylether may be replaced by other solvents, or solvent mixtures, possessing a similarly low rate of evaporation of the order of approximately .05 millimeter of mercury or less vapor pressure at ordinary temperature and a marked acceleration of the volatility at raised temperatures. It may be desirable in some circumstances to omit the last two types of ingredients referred to in the illustrative formula, namely, those which have been added in order to offset extreme hardness and brittleness.

With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly. Thus a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use.

The novel ink and process described above are not only capable of utilization in printing upon paper, but they are also adapted for use in making very satisfactory prints upon many other surfaces, such as for instance textiles or metallic surfaces, or the lacquered surfaces of cellophane, or the like, where the production of a satisfactory print has heretofore been much restricted.

Defendant's Exhibit E.

B.

It is apparent that such an ink as has been described does not necessitate the admixture of driers, does not set or harden on the printing rollers or plates, but is yet capable of being dried very quickly when subjected to suitable temperatures after being printed, by the evaporation of the solvent from the thin layer of the print. The finished products are flexible prints in which the pigment is well protected against being rubbed off. They are not softened by moisture, grease, or chemical influences and possess practically no odor. The ink adheres securely to almost every type of surface.

Defendant's Exhibit E.

B 2269

What I claim is:

1. A vehicle for coating material comprising a solution which is relatively non-volatile at approximately room temperatures but which is highly volatile at elevated temperatures.

2. A vehicle for coating material comprising a solution of nitrocellulose, said solution being relatively non-volatile at approximately room temperatures but highly volatile at elevated temperatures.

3. A vehicle for coating material comprising a solution of nitrocellulose in a solvent possessing no appreciable volatility at approximately room temperatures but being highly volatile at elevated temperatures.

4. A coating composition comprising a solution having a high boiling point combined with a relatively low vapor pressure at approximately room temperatures, but being characterized by a rapid rise in its vapor pressure curve at elevated temperatures.

5. A coating composition comprising a solution of nitrocellulose in a solvent having a high boiling point combined with a relatively low vapor pressure at approximately room temperatures, but being characterized by a rapid rise in its vapor pressure curve at elevated temperatures.

6. A coating composition comprising a coloring material incorporated in a solution of nitrocellulose in a solvent having a high boiling point combined with a relatively low vapor pressure at approximately room temperatures, but being characterized by a rapid rise in its vapor pressure curve at elevated temperatures.

7. A printing ink comprising a pigment dispersed in a solution of nitrocellulose in a solvent having a high boiling point combined with a relatively low vapor pressure at approximately room temperatures,

Defendant's Exhibit E.

but being characterised by a rapid rise in its vapor pressure curve at elevated temperatures.

8. A printing ink comprising a coloring material incorporated in a diethylene glycol butylether solution of a cellulose ester.

9. A printing ink comprising a pigment dispersed in a solution of nitrocellulose in diethylene glycol butylether.

10. A printing ink comprising a pigment dispersed in a solution of nitrocellulose in diethylene glycol butylether, said solution having plasticizing ingredients incorporated therein.

Defendant's Exhibit E.

IN WITNESS WHEREOF I have hereunto subscribed my name this 25th day of June, 1932.

Albert E Gessler

OATH.

STATE OF NEW YORK)
: SS.:
COUNTY OF NEW YORK.)

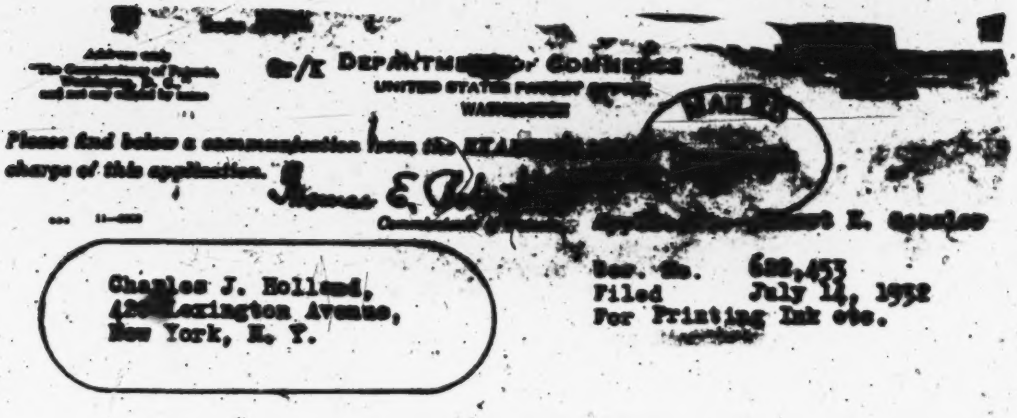
ALBERT E. GESSLER, the above named petitioner, being duly sworn, deposes and says that he is a citizen of the United States and a resident of Yonkers in the County of Westchester and State of New York that he verily believes himself to be the first, original and sole inventor of improvements in PRINTING INK AND METHOD OF UTILIZING SAME described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, or more than two years prior to this application or in public use or on sale in the United States, for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States on an application filed by him or his legal representatives or assigns, more than twelve months prior to this application; and that no application for patent on said improvements has been filed by him or his representatives or assigns in any country foreign to the United States.

Albert E Gessler

Sworn to and subscribed before me this 25 day of June 1932.

R B Schlatter

Defendant's Exhibit E.



Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Charles J. Holland,
420 Lexington Avenue,
New York, N. Y.

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink etc.

References made of record:-

Dove	1,877,748	Sept.13,1932(filed 2-11-29)	134-28X
Shannon	1,880,502	Oct. 4, 1932(" 9-22-31)	134-28
Shipley et al	1,618,483	Feb. 22, 1927	134-79
Imperial, Ltd.(Br.)	360,815	Nov. 2, 1931	134-[illegible]
Middleton	1,833,086	Nov. 24, 1931	134-28
Celanese Ltd.(Br.)	296,759	July 4, 1929	134-32

Solvents- Durrans- Pub. by Chapman E. Halls, London, 1930 page 106 (Copy in Div.50)

Claims 1 and 4 are rejected as indefinite and functional.

Claims 3, 5, 6 and 7 are rejected as indefinite and functional in the use of "a solvent possessing ----- temperatures" "a solvent having a high boiling point combined with ----- temperatures".

Claims 6 and 7 are substantial duplicates. The mere difference in the preamble to the claims does not patentably distinguish them.

Claim 8 is rejected as misdescriptive. Cellulose is not soluble in diethylene glycol butylether.

Claims 1-7 are rejected as substantially anticipated by Dove, Shannon, Shipley, Middleton, or either of the British references cited above.

Claims 8-10 are rejected as unpatentable over Dove, cited above. To add nitrocellulose and a plasticizer to the composition shown by Dove would not involve invention in view of the well known use thereof in printing inks as shown in the references supra.

Claims 8-10 are further rejected as unpatentable over Shipley et al or British patent 360,815 which show compositions comprising

Defendant's Exhibit E.

688,453 -2-

a cellulose ester, a solvent for the cellulose ester (butyl ether of ethylene glycol), a pigment, and a plasticizer. To substitute diethylene glycol butyl ether for the solvent shown by Dove, Shipley et al or British patent 360,815 would not involve invention in view of the well known use and properties thereof as shown on page 106 of the publication cited above.

Claims 8-10 are also rejected as unpatentable over Shannon, Middleton or British patent 296,759 cited above. These references show it is old to incorporate a pigment or coloring material in a solution of nitrocellulose and to use such composition as an ink. In view of the well known properties of diethylene glycol monobutyl ether as a solvent for cellulose esters it would be obvious to substitute such solvent for the solvents shown in the references. Furthermore, the addition of plasticizing agents to the compositions shown by Shannon, Middleton or the British patent 296,759 would not involve invention since ink compositions containing such agents are old as shown in the references cited above.

O. Beake

Examiner.

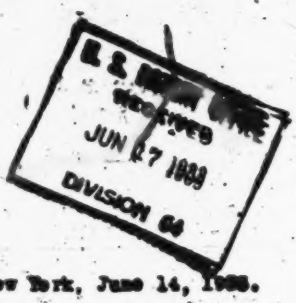
Defendant's Exhibit E.

Schedules (2)

9
-3

64

Div. [illegible] Room 4961
ALBERT E. GORDLER
PRINTING INK, etc.
Ser. No. 688,498
Filed July 14, 1933.



New York, June 14, 1939.

HON. COMMISSIONER OF PATENTS,
Washington, D. C.

S i r : -

Replying to Official Letter dated December 27, 1938, applicant amends as follows:

Specification, page 2 lines 19-21, cancel "this defect, however, may be remedied by the present invention, which involves a recognition of the principle" and substitute - But I have also found; line 21, insert a comma after "exhibit" and before "elevated" insert temperatures; line 22, before "temperatures" insert above room and after "temperatures" insert a comma; line 25, change the comma after "rapidly" to a period, cancel the remainder of the paragraph and substitute therefor the following: Consequently the print which is made by the use of an ink prepared with such solvents may be dried practically instantaneously upon the application of sufficient heat to cause the evaporation of these solvents.; same page line 27, insert high before "boiling" and cancel "high" before "vapor"; line 28, cancel "at elevated temperatures" and substitute which increase very rapidly upon elevation of temperature; line 30, cancel "highly volatile" and insert after "solvents" - that are highly volatile at ordinary temperatures.

Page 3 line 8, cancel "or solvent mixtures"; between lines 16 and 17 insert the following paragraph:

While I have stated that the solvents utilized in the formation of the novel printing ink are generally characterized by their high boiling points and by a vapor pressure at room temperatures which is low and of the order of about one millimeter of mercury or less, the most preferable solvents are those which have a vapor pressure considerably less

than one millimeter of mercury at room temperatures, or solvent mixtures having this vapor pressure characteristic. Thus, as will be seen from the specific example hereinafter given, a solvent mixture comprising diethylene glycol butylether and dibutyl phthalate is illustrative of the type of solvent media which are preferred. Diethylene glycol butylether has a vapor pressure at room temperature (20°- 25° C.) of about .08 millimeter of mercury. When the diethylene glycol butylether is mixed in a proper proportion with another solvent which has no appreciable vapor pressure at room temperature, such as dibutyl phthalate in the example given, the vapor pressure of the solvent mixture at room temperature is accordingly repressed still further. It is to be understood, therefore, that solvents having a vapor pressure of about .05 millimeter of mercury or less when mixed with other solvents having sufficiently low vapor pressure at room temperature, will come within the scope of the present invention. It is also the case that some solvents unmixed may have a very low vapor pressure at room temperatures but a very high vapor pressure above 100° C. and may, therefore, come within the scope of the present invention.

Page 3 line 17, cancel "further" and insert -- seem to be best obtained by the use of a main solvent, such as diethylene glycol butyl ether,; line 20, cancel "as" and insert and characterized in.

Page 3 line 25, after "alone" insert the following:

Certain high boiling point solvents of the nature alluded to are unique in that they not only serve to plasticize the gummy film obtained after the main solvent has evaporated, but they also exert a solvent action upon the cellulose compound or natural or synthetic resin sought to be dissolved. Such solvents do not evaporate upon heating the compound, for they boil at considerably higher temperatures than are necessary to drive off the main solvent. Yet, as above indicated, such solvents have a negligible vapor pressure at ordinary temperatures and at the same time exert a repressing action on the other solvents and may be admixed with such other solvents in order to reduce or repress the normal vapor

Defendant's Exhibit E.

pressure of such other solvents at room temperature. Thus, the dibutyl-phthalate referred to in the following example as illustrative will be seen to be of considerable importance by reason of the fact that its characteristically low vapor pressure at ordinary temperatures (this solvent has no appreciable vapor pressure at room temperatures) makes it admirably suited for intermixture in a proper proportion with solvents whose vapor pressure at room temperature is too high to enable them to be used alone as a solvent in my novel printing ink, and the vapor pressure of the mixture may thus be regulated so that it falls within the preferred range indicated.

Page 4 line 7, after "product" insert -- and to repress the vapor pressure of the solvent media at room temperatures; line 11, cancel "one" and substitute - .05 of a; line 13, cancel the sentence beginning "It may be" and ending at line 16.

Claims 1, 2 and 3, line 2 of each claim, after "non-volatile" insert (i.e. which has a vapor pressure of .05 of a millimeter of mercury or less).

Claim 1 line 3, and claim 2 line 3, cancel "appreciably greater" and substitute therefor elevated.

Claim 4 line 2, after "pressure" insert of .05 of a millimeter of mercury or less.

Claim 5 line 3, after "pressure" insert of .05 of a millimeter of mercury or less.

Claims 6 and 7, line 3 of each claim, after "pressure" insert of .05 of a millimeter of mercury or less.

Claim 8 line 2, change "cellulose" to a cellulose ester.

REMARKS.

Before discussing the references which have been cited, the Examiner's attention is directed to the general state of the printing art at the present time. With the exception of printing upon very soft and absorbent papers, such as newsprint, it has not heretofore been possible to print and ship the printed material on the same day. Although

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printing presses having comparatively high speeds are now well known and are used extensively in the industry, it is not possible to obtain full advantage of the speed with which they operate on account of the character of the printing inks now obtainable. These inks are relatively slow-drying and it is necessary to associate tympans or slip sheets with the printed material so that the matter may be stacked or wound upon reels and carried to the drying chamber and dried for a period of time before the printed matter can be unstacked or unwound and cut and bound, folded or otherwise prepared for shipment. These known inks have, of course, various different qualities, -- for instance, viscosity, tack, drying properties, etc., -- yet all are characterized by the fact that they are relatively slow drying.

The present invention, by the utilization of a concept which after being explained seems to be extremely simple, overcomes the difficulties inherent in the use of the ordinary printing inks heretofore known. The new ink may be used with any standard equipment without injury thereto. The ink may be left upon the press and in the fountain for any period of time, and during the periods when the press is not normally running, without danger of the ink hardening or congealing, and yet, due to the inherent physical properties of the solvent used, the ink will dry almost instantaneously when subjected to elevated temperatures. This is accomplished by providing any type of drying equipment through which the printed material may run after having been printed upon in the press. The material may be cut, sorted and bound immediately and, depending, of course, upon the efficiency of the equipment used, may be shipped in complete bound form during the same hour in which it was printed. This is an accomplishment which has heretofore been only a dream in the printing industry.

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With the ink of the present invention, no special equipment is necessary and any usual type of heating apparatus used in the drying of continuous sheet goods in general may be utilized.

Other advantages of the invention are as follows:

(1) The ink is non-absorbent and, therefore, less ink is required for a given coverage than is the case with an ordinary ink.

(2) The ink does not "halo", which is a term used in the printing industry to characterize the tendency of an ink to move outwardly from the point at which it has been applied, and thus form irregular markings upon the surface printed upon.

(3) The ink does not harden to an extent which interferes with overprinting. An over-print may be made weeks or even months after the initial printing without any appreciable diminution of the capacity of the material printed upon to take the second print.

(4) Successive sheets of material will not offset or stick together because each ink film dries practically instantaneously. Thus, there can be no smudging due to the wetness of the print.

Other advantages of the invention will be seen from the following discussion of the references which have been cited against the claims.

It is not understood why the Examiner objects to the recitation of the volatility or boiling point characteristics of the solvent employed in the present invention. The volatility and boiling point of the solvent at specified temperatures are factors which may be resolved into terms of vapor pressure, as has been done in some of the claims, and are definite physical attributes of the solvent used. Certainly, the patent law does not forbid an applicant or a patentee from using ordinary descriptive terms of the physical characteristics of an article or a product in claiming his invention. Indeed, such terms are accepted as the common method of description and limitation in accordance with the requirements of the statute. The terms used in applicant's claims

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are no more functional than are the limitations "elongated" or "metallic" when used to define a specific body or member used in a mechanical article, combination or device, and where such a body or member is constructed in accordance with the descriptive limitations imposed and a new and useful result is obtained, a patentable structure has always been considered as having been properly defined. By direct analogy, the particular physical characteristics of the solvent employed in the present invention do not distinguish from the prior art merely in terms of function as contended by the Examiner, but they accurately and positively identify the attributes such solvent must have in order that the new and useful results disclosed may be obtained.

In this connection it is pointed out that it is the physical characteristics of the solvent mixture used in the present invention that are important in securing the results sought. While the organic chemical compound known as diethylene glycol butylether has been given as illustrative of the type of solvent possessing the desired physical attributes, it is pointed out in the specification that any solvent possessing these characteristics may be used. It is these physical characteristics which are utilized and the Examiner is cautioned in his application of the references to look for a composition involving the utilization of these physical principles and not for a composition including the specific chemical illustrated when used for some purpose not concerned with the physical manifestations of such chemical.

As to the objection of indefiniteness, the Examiner's attention is called to the fact that the specification fully sets out the meaning of the terms "low vapor pressure" and "low volatility", and gives definite temperatures at which this vapor pressure or volatility is measured. It has also set out what is meant by "high volatility" and "elevated temperatures". In the specification as originally written and as amended by the accompanying amendatory matter, it is specifically stated that the solvent should have a vapor pressure of one millimeter

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or less at room temperatures, specifically .08 of a millimeter or less, but that upon an elevation of temperature to 100° C. and over, the vapor pressure should rise rapidly to a point where the rate of vaporization is so great that the ink dries almost instantaneously Very few solvents satisfy these requirements, as will be seen upon reference to the table which is submitted herewith. None of the references discloses the use of a solvent which satisfies these requirements, and no reference even remotely suggests the inventive concept of the present application. Although, as previously indicated, the idea seems quite simple and obvious when once its nature is explained, it is in fact a discovery which is of momentous importance in printing and its allied arts, and one which years of experience and practice has until now failed to produce.

The patents cited clearly disclose the fact that although the patentees might have planned to make cellulose ester solutions with slower drying solvents than the ordinary run of lacquer solvents, in order to make brushing lacquers or film marking inks, they did not contemplate making inks for printing paper. The solutions described in these patents, although they are slower drying than ordinary lacquer solutions, are still much too fast in evaporation. The slowest one mentioned, the butyl ether of monoethylene glycol, has a vapor pressure about sixteen times higher than the diethylene glycol butylether of the present application. No continuous printing could be carried out with them because the ink carrying rollers would dry up in a very short time. The patents show that the patentees did not recognize or understand that commercially usable printing inks derived from cellulose esters cannot possibly be made unless solvents are employed which will not evaporate nor dry on the printing roller at ordinary temperature, no matter how thin or fine the ink film may be, as is, for instance, the almost microscopically thin film of ink spread in finest network over the roller in the half tone printing of most illustrations and pictures.

The patentees did not understand that these solvents must possess an exceedingly low vapor pressure at ordinary temperature. The example in the present specification uses diethylene glycol butylether which has a vapor pressure of .05 mm. at 20° C. which is about 350 times less than that of water at 20°C. and consequently possesses so little tendency to evaporate that a thin film will stay wet for an indefinite time. However, at sufficiently raised temperatures these solvents show such a sharp increase in vapor pressure that they will evaporate practically instantaneously if the printed material is exposed to heat. In the example, diethylene glycol butylether increases its vapor pressure about 360 time at 100° C. over that at 20° C. and about 8000 times at 150° C. The temperature of the printed material when it passes, for instance, over a heated roller, lies between 100° C. and 150° C., and it is evident that practically instantaneous evaporation of the ink takes place and the printed sheet leaves the heating device in a dry state. As previously indicated, the patents cited are barren of any disclosure involving this concept.

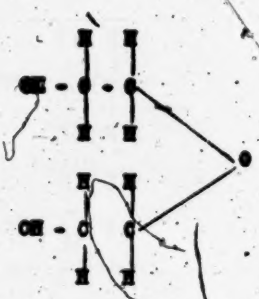
It is pointed out that even considering the chemical compounds of the references without reference to their physical characteristics, the Examiner's contention of anticipation fails. Even in a chemical sense there is a wide and unmistakable difference between an ethylene glycol ether and applicant's diethylene glycol ether. This difference is pointed out emphatically in the Durrans book on Solvents which the Examiner himself has referred to. On page 108 line 10 it is stated:

> "The above name (diethylene glycol ethyl ether) commonly given to this ether is incorrect; a more correct name is hydroxy-ethoxy-ethyl ether".

The same observation holds true for the diethylene glycol butyl ether. The mother substance, diethylene glycol, as seen by the following formula, is not a straight alcohol as is ethylene glycol, but is partly converted into an ether, with the formation of an entirely different chemical compound:



Ethylene-glycol



Diethylene-glycol

The patent to Dove relates to the preparation of dye solutions from water soluble dyes without the aid of water. The dye is dispersed in one of a number of derivatives of the ethylene series of hydrocarbons, among which are listed certain monoethylene glycol ethers. These ethers do not possess a low vapor pressure at room temperatures. The n-butyl ether referred to by Dove has the lowest vapor pressure of all those mentioned but is still much too high for use in a printing ink and would result in the rapid evaporation of the solvent of the ink and the drying of the ink on the rolls or in the fountain of the press. It should be noted that the Dove patent is not concerned with cellulose esters or gums at all and, therefore, is quite remote from the present invention.

From the above it will be seen that the solvents of Dove were not chosen by the patentee because of the physical characteristics called for in applicant's claims and that they do not possess such characteristics. There is no mention in the specification of Dove of an ether having a low vapor pressure at ordinary temperatures and high volatility at elevated temperatures. The patent is concerned merely with a limited subject matter concerning dye solutions suitable for impregnating wood and has nothing whatsoever in common with the present applicant's invention.

The Shannon patent is concerned with printing on cellulose ester films such as those used in the moving picture industry. The solvent used by Shannon is ethylene glycol monomethyl ether alone or in combination with the acetate of ethylene glycol monomethyl ether. The

high vapor pressure of this solvent at room temperatures (see table submitted herewith) precludes all possibility of using the product as a solvent for printing inks applicable to the general field. It is apparent that the solvent of Shannon could not be used in applicant's composition and that the disclosure of these solvents in no sense anticipates the use of solvents having entirely different characteristics and chosen for a specific and different purpose as in the present applicant's invention.

The Shipley patent is concerned with a brushing lacquer such as that alluded to in applicant's specification in the paragraph beginning on page 1 line 87, and is one which is highly volatile at room temperatures. The specific solvent used is butyl ether of monoethylene glycol (the same as one of those mentioned by Rowe), and the vapor pressure of this solvent at room temperatures is much too high to be usable for printing inks.

In addition it is pointed out that the Shipley patent makes repeated allusions to the necessity of adding driers (see page 1 lines 43-47 inclusive, and page 2 lines 13-24 inclusive), and it is thus apparent that Shipley is concerned with a brushing lacquer which is so volatile at ordinary temperatures that it dries at such temperatures in very short periods of time. As stated in applicant's specification, such a lacquer is entirely unsuitable for the purposes of the present invention.

The Middleton patent, like Shannon, is for cellulose ester moving picture films. The solvent employed is either monoethylene ether of ethylene glycol or diacetone alcohol. These solvents have high vapor pressure at room temperatures and are desired by Middleton because "they have highly desirable drying properties" (See page 1 lines 96, 97 of Middleton patent). These solvents (see table) belong to the class of high vapor pressure solvents and have no bearing on the present invention except in so far as they emphasize the applicant's departure from the known art.

The British patent No. 260,615 is concerned with printing linoleum. The patentee merely mixes drying oils and certain high boiling

point solvents with a cellulose ester to give quicker drying. It is apparent that even at the high temperature in the drying apparatus used in the linoleum industry, the drying time required is two or three days. (See page 3 line 7 of the British patent). Ethyl lactate, butyl lactate, glycerol diethyl ether are the solvents used. All have high vapor pressures at room temperatures and are distinctly different from those which are desired in the printing ink of the present invention. Solvent naphtha (boiling point varying between 120-180° C.) possesses a high rate of evaporation and even though the high boiling point solvents, butyl lactate or the butyl ether of ethylene glycol (see remarks directed toward Dove and Shipley), are much too fast in evaporation by themselves for use in printing inks, their admixture with naphtha shows clearly that the inventors of the process of the British patent No. 360,815 had no inkling of what solvents should be used in producing the novel printing ink of the present invention.

As it is apparent that the solvents of the British patent have a relatively high vapor pressure at room temperatures, and are used in a non-analogous art for a different purpose from that which applicant has in mind, it is submitted that the invention of the present applicant is a great deal more than the mere substitution, as contended by the Examiner, of a special solvent in the disclosure of British patent No. 360,815 or in Shipley, as both of these patents are totally lacking in the teaching of the principles of the present invention.

British patent No. 295,750 is for marking fabrics during processing. Like the British patent 360,815, the composition disclosed consists of a pigment, a drying oil, and cellulose ester and "any suitable solvent" (page 1 line 45). There is no suggestion of any particu-

lar physical attributes of a solvent which can be used to satisfy the requirements of the present invention. Ethyl acetate, the particular solvent which is given, has a very high vapor pressure at room temperatures and is, therefore, completely outside the range of the present invention.

The disclosure in the publication "Solvents" has to do with the solvent properties inherent in diethylene glycol butylether but contains no disclosure of the vapor pressure characteristics. Even if this publication did contain a disclosure of this nature, it would not be a reference for the present invention as the application of these properties to the specific purpose disclosed in the present specification is something which it is not possible to gather from the matter set out on page 108 of the publication mentioned. In this connection it is pointed out that this reference is contradictory even in its disclosure of the solvent properties of the composition as it states that it dissolves cellulose acetate (11th line from the bottom), yet later states that it does not dissolve cellulose acetate (9th line from the bottom). It is not seen what possible connection the reference has with the present invention except to confirm the existence of a compound which is given as illustrative of the type which may be used by the applicant. The existence of such a compound is, of course, admitted.

A list of vapor pressures, evaporation rates and boiling points of the various solvents of the references, as well as the same characteristics of the exemplary solvents of the present invention, are set out below in order to facilitate comparison.

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Name of Solvent	Evaporation rate	Vapor Pressure in mm. at 20° C.	Boiling Point
Ethyl-acetate	-	72.8	77°
Water	-	17.4	100°
Ethylene-glycol-methylether	-	7.8	124°
Ethylene-glycol-ethylether	84	4.6	134°
Ethylene-glycol-ethylether-acetate	50	1.85	150°
Ethyl-lactate	58	-	137°
Diacetone	34	-	160°
Ethylene-glycol-butylether	25	.85	170°
Butyl-lactate	13	-	185°
Di-ethylene-glycol-butylether	-	.05	222°
Di-butyl-phthalate	-	-	340°

The above table has been made up from available sources of information. When figures on vapor pressure at 20° C. were not available the figures of evaporation rate have been supplied.

Also submitted as Schedules A and B are photostatic copies of pages 7 and 11 respectively of the article "The Glycol Ethers and Their Use in the Lacquer Industry" by J. G. Davidson. The photostats are taken from a reprint of the article bearing the legend "Reprinted from Industrial and Engineering Chemistry, Vol. 18, No. 7, page 669, July, 1926". The charts show the vapor pressure of the important organic solvents as well as those of the plasticizers. On Schedule A applicant has indicated the approximate curves for diethylene glycol butyl ether and for butyl phthalate, indicated by the letters B and C respectively. While the charts do not show the differences between the compounds in the lower portions of their vapor pressure curves, they do show the distinct differences between the various compounds at higher temperatures. However, the charts are submitted more for the information of the Associate Examiner (who kindly granted an interview to the attorney of record recently) than as support for the remarks of the present amendment, as the table above referred to is thought to be ample support for the latter.

The claims have been amended definitely and clearly to set

forth the differentiating features discussed above, and to define the invention over the references cited. They will, therefore, not be individually commented upon except to state that the broad claims have been amended to specify the upper limit of .02 of a millimeter as the vapor pressure of the solvent at room temperatures, and that the references fail to suggest a solvent of this nature or a composition at all similar to that recited. It is pointed out, however, that claim 6 calls for any coloring material incorporated in a solution of nitrocellulose, while claim 7 is more limited in specifying a pigment dispersed in such a solution. It is felt that these two claims quite clearly are patentably distinct from one another.

Favorable reconsideration is thought to be in order.

Respectfully submitted,

Charles Holland

Attorney for Applicant.

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Schedule A

Cyclic Ether Derivatives of the Glycols

The elimination of a molecule of water from a single molecule of glycol instead of from two, as in the formation of the polyglycols, results in the formation of a cyclic ether, usually called an oxide.

In this way ethylene, propylene, and butylene oxides may be produced from their respective glycols. These oxides

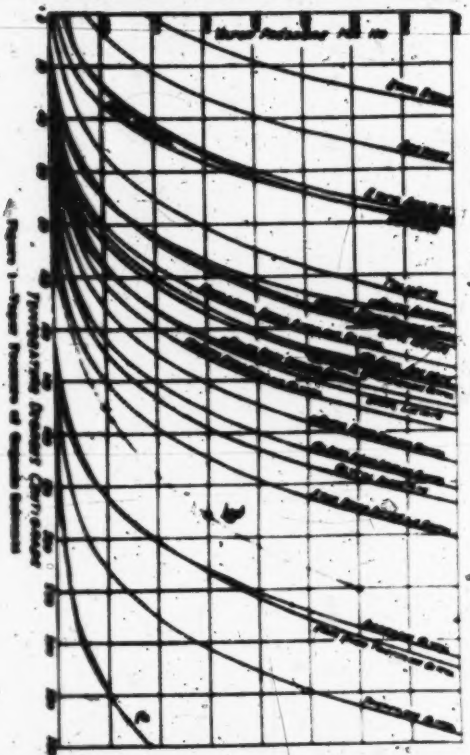


Figure 1—Vapor Pressure of Organic Solvents

are very powerful solvents, dissolving cellulose nitrate, acetate, and ether with avidity. They are soluble in water and are almost odorless. Ethylene and propylene oxides, having the respective boiling points of 10.5° and 35.0° C., are too volatile for general use, but the higher boiling oxides should prove important industrial solvents.

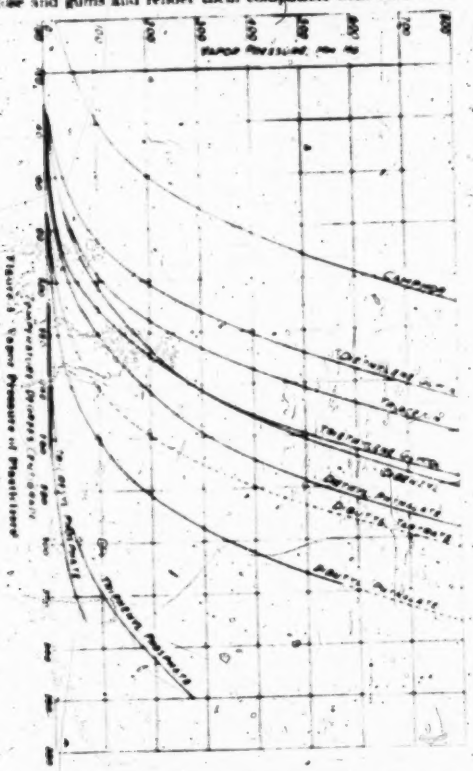
Only one ethylene oxide is possible, but two propylene and

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Sched le B

cated, not upon the fundamental requirements of an ideal film, but principally upon the availability at reasonable cost of nitrocellulose solvents in the "medium boiler" class. The choice of solvents in this range has never been very large and until now has, for all practical purposes, been limited to a single ester.

An ideal solvent is one that will readily dissolve nitrocellulose and gums and render them compatible with each other.



It must not evaporate so rapidly that "orange peel" or other surface defects will appear. It must permit high dilution with the cheaper nonsolvents such as toluene, and the addition of small amounts of water without precipitation of the nitrocellulose. It is also essential that the solvent will not hydrolyse with the production of acid, as this would have a deleterious effect upon the permanency of the film. Hydrolysis

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Div: 64 Room 4708 50/[redacted] Paper No. 4

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE

Please find below a communication from the EXAMINER in charge of this application.

[redacted] Commissioner of Patents.

Albert E. Gessler

Charles J. Holland,
420 Lexington Avenue,
New York, New York.

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink and Method of Utilizing Same

MAILED SEP 13 1933

Responsive to amendment filed June 15, 1933:

Additional references cited:

Von Hüeckeroth - "Lacquer Liquids" Circular No. 359 - Pages 108 and 149 - Jan., 1930 - H. A. Gardner, Washington, D. C. Copy in 134-79 in Division 50)

Lawrence	1,899,420	Feb. 28, 1933 (filed June 26, 1928)	134-28
Johnson (Br.)	335,074	Sept. 18, 1930 (no drawing-2 sheets spec.)	134-35

This application is now in Division 54.

Claim 3, line 2, the suggested amendment to "non-volatile" cannot be made as the term is not found in the claim.

Claim 1, line 2, the parentheses should be erased as they are not proper, and note Ex parte Cahill, page 78 of 1893 C. D.

Claims 1 to 7, "room temperatures" is indefinite as the temperature of a room varies as from 20° to 90° F, depending upon the season and whether the room is heated or not. Possibly applicant means 20° C.

Claims 1 to 7, "elevated temperatures" is indefinite and comparative. Note Ex parte Mayle, 3 0. G. 751, Ex parte Smith, 399 O. G. 209, and the recent decision, In re Short, 432 O. G. 513. Claims 1 to 7, inclusive, are accordingly rejected as indefinite and as not pointing out the alleged invention for including the indefinite and

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SHEET NO. 2 Serial No. 622,453

comparative terms stated above.

Claims 1 to 6, inclusive, are rejected as drawn broader than the alleged invention which, as stated in the oath and object of invention, is a printing ink. Claims 1 to 6, inclusive, are also rejected as readable upon page 149 of Circular 359 in which butyl carbitol is disclosed as having a vapor tension of .05 m.m. of mercury and is said to be a solvent for nitrocellulose and very useful where a slowly evaporating solvent is desired. Imperial 300,815 of record shows the use of dissolved nitrocellulose as a coating composition, also does Shipley of record.

Claim 7 is rejected similarly as unpatentable over page 149 of Circular 359 as it is old to use dissolved nitrocellulose in an ink as shown by Celanese, 296,759 of record or 335,074.

Claims 8 and 9 are rejected likewise as substantially met by the butyl carbitol described in Circular 359. Cellanese shows using chrome yellow as a pigment.

Claim 10, line 3, "plasticizing ingredients" is too broad as only one plasticizer is disclosed.

Claim 10 is rejected as unpatentable over Circular 359 which on page 108 shows dibutyl phthalate to be old as a plasticizer for nitrocellulose, and on page 149 shows butyl carbitol as a solvent for nitrocellulose. To mix these two ingredients broadly to form an ink is not thought to be patentable.

Lawrence is made of record as pertinent and shows using carbitol and ethyl cellulose with air-blown castor oil.

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EXAMINER.

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U. S. PATENT OFFICE
RECEIVED
JUL 14 1934
DIVISION 64

Div. 64 Room 4408
ALBERT E. GESSLER
PRINTING INK AND METHOD
OF UTILIZING SAME
Serial No. 688,488
Filed July 14, 1933.

New York, March 13, 1934.

HON. COMMISSIONER OF PATENTS,
Washington, D. C.

S i r : -

Replying to Official Letter dated September 15, 1933, applicant amends as follows:

Specification, page 1 line 30, after "volatility" delete the period and insert and the dissolved substances are present therein in relatively low concentration.; same line, cancel "this characteristic is" and insert these characteristics are; same line, cancel "an" and insert of.

Page 2 line 1, cancel "a" and insert free-flowing and; same line, cancel "is" after "hardening" and insert are; line 2, before "rapid" insert low concentration of solids and; same line, change "renders" to render; line 9, before "cellulose" insert low viscosity; same line, after "in" insert neutral; line 27, insert neutral before "solvents"; line 28, after "which increase very rapidly upon elevation of temperature" insert:

Inks prepared with such solvents are sufficiently free from highly volatile, low-boiling solvents as to be substantially non-drying at room temperatures.

Same page, line 29, after "solutions" cancel "in contradistinction to lacquer solutions which require solvents that are highly volatile at ordinary temperatures", delete the comma after "temperatures" and insert differ from lacquer solutions which are of relatively low solids concentration and require solvents that are highly volatile at ordinary temperatures. In sharp contrast, those of the present invention are of a relatively high concentration, sufficient to produce the normal qualities of tack and viscosity of a printing ink, and.

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Page 2 before line 86, insert the following paragraph: By room temperatures, I mean the ordinary temperatures of a room in which technical work is carried on, which is generally accepted to be 20° to 25° C.

Page 3 line 8, after "raised" insert:

In other words, such solvents boil on elevation of the temperature to say 200° or higher, and the vapor pressure increases to 760 millimeters of mercury.

Cancel the claims and substitute the following:

11. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material incorporated in a vehicle consisting of low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in neutral organic solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration of a lacquer~~, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

12. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material incorporated in a vehicle consisting of low viscosity cellulose esters, dissolved in neutral organic solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration of a lacquer~~, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

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13. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material incorporated in a vehicle consisting of a resin that is solid, coherent and non-sticky when solvent free dissolved in ~~neutral~~ organic solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration of a lacquer~~, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

14. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material and a plasticizer incorporated in a vehicle consisting of low viscosity materials selected from the group comprising cellulose compounds and resins that are solid, coherent and non-sticky when solvent free dissolved in ~~neutral~~ organic solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration of a lacquer~~, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

15. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a pigment incorporated in a vehicle consisting of low viscosity nitrocellulose dissolved in diethylene glycol butyl ether and admixed with dibutyl phthalate, the concentration of said dissolved materials being sufficient to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concen-~~

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~~vention of a lacquer~~, the solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

REMARKS.

The claims have been rewritten as a result of a recent interview very courteously accorded the applicant and his attorney by the Examiner. In drawing these claims, the applicant has endeavored to adhere to the requirement of clear definition and in addition he has endeavored to emphasize the distinctions over the prior art which the Examiner indicated to be requisite. The applicant's contribution to the art was recognized by the Examiner and the main points of contention were concerned with the formal construction of the claims.

In respect to the Examiner's objection that "room temperatures" is indefinite, it is respectfully pointed out that this term is used quite universally to mean ordinary or normal temperatures of a room in which people live and work, especially where scientific work is carried out. In the United States the term means about 25° C.; 24° C. or even 23° C. would be room temperatures, being as near 25° C. as may be. An experimenter when told to carry out an experiment at room temperature would take it for granted that some temperature approximately 25° C., as nearly as conditions at the time permit, are quite in line with these instructions. In England and on the Continent, 20° C. is generally considered the standard of room temperature, and any temperature approximating 20° C. is to be considered satisfactory if room temperature is required.

The term "room temperature", therefore, means a substantially distinct range of temperature around 25° C. or from approximately 20° C. to approximately 25° C. A skilled chemist does not feel at all uncer-

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tain when room temperatures are specified and to him there is nothing indefinite about it.

The quality of applicant's solution or solvent, of being highly volatile when subjected to heat, is an important counterpart of its characteristic of manifesting little if any volatility at room temperatures. This quality may be described variously in the specification and claims as the quality of being "highly volatile at elevated temperatures", as having the property of evaporating rapidly at elevated temperatures, or as characterized by "a rapid rise of its vapor pressure curve at elevated temperatures". In this connection it is requested that the Examiner consider again that the teaching of the present invention includes a new correlation and adaptation of these qualities. If a solvent or solution is used to make an ink, which solvent or solution has no vapor pressure at room temperature but is highly volatile at 90° C., the teaching of the invention is satisfied. Similarly, if high volatility (that is, the point of rapid volatilization) is not obtained until 800°C. is attained, the teaching of the invention is still followed. Any solvent or solution which possesses the quality of substantially no vapor pressure at room temperatures but whose vapor pressure curve rapidly rises upon elevation of temperature, comes within the teaching of the present applicant. It would be distinctly unfair to limit him to a specific temperature range as a measure of high volatility. In the light of applicant's teaching, "elevated temperatures" is not indefinite at all; in fact, it quite clearly and exactly defines this feature of the invention. In other words, while applicant is prepared to admit that, abstractly, "elevated temperatures" does not specify a definite range, the term as used in this specification is quite sufficient and definite in pointing out the qualities of the solvents or solutions required to satisfy his teaching.

In order, however, to give an indication of the high boiling characteristic of the solvents used in the present invention, the spec-

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ification and claims have been amplified by calling for a boiling characteristic, -- i.e., where the vapor pressure becomes equal or greater than atmospheric pressure -- of 760 millimeters of mercury at 200° C. or higher. Pure diethylene glycol butyl ether boils at 231.2° C. at 760 mm. atmospheric pressure.

The decisions cited by the Examiner do not support him. None of them contain the remotest implication that "elevated temperatures" is an indefinite expression, or that a claim including it is improper for this reason. That the particular expressions considered in these cases cited were disapproved is no reason whatever for holding the expression under consideration -- one different in nature and used in a descriptive and not a qualifying sense -- to be improper. The expressions are distinctly and unmistakably different. The abstract indefiniteness of "elevated temperatures" is not applicable to the present case because the expression is not used in a qualifying sense and is not open to any doubt in the light of the present applicant's teaching.

In view of the above it is felt that the Examiner will perceive that the formal objections to the terms "room temperatures" and "elevated temperatures" on the ground of indefiniteness is not well taken and will find that the new claims are in full accord with the spirit as well as the letter of the statute, despite the fact that they still include such expressions.

It is not felt that the claims either as originally written or in their amended form are either broader than the invention or readable on page 169 of the circular cited. Broadly, a printing ink is a coating material, and such a material having a vehicle comprising a solution of nitrocellulose in a solvent such as butyl carbitol, which solution predominates in the characteristics of butyl carbitol, is new with applicant. This is true despite the disclosure in von Hueckeroth's circular, for this reference merely gives the formula for butyl carbitol together with some of its characteristics. These factors are conceded to be well known. While there is an observation that it is a solvent

Defendant's Exhibit E.

few nitrocellulose, this is no anticipation of applicants product, as applicant is not claiming that he has discovered a new solvent for nitrocellulose. While, also, it is observed that it, butyl carbitol, is useful where a slowly evaporating solvent is desired, there is no suggestion that it is to be desired in a product such as applicant's. This is only apparent in retrospection, in view of applicant's disclosure of a specific product where it is desired and where he himself has discovered its desirability. In other words, the proposed use of butyl carbitol as suggested by von Hueckeroth does not imply that it is possible to make a coating composition with it, particularly one where the characteristics of butyl carbitol predominate.

The claims have, however, been amended to call for a printing ink. This has been done merely to expedite the prosecution of the case and to emphasize the novelty of applicant's product. It is unmistakable that the von Hueckeroth circular is totally lacking in anticipation of applicant's printing ink, as printing inks have not been made with nitrocellulose, nor have they heretofore been made with the solvents or solution specified by applicant.

British Imperial No. 360,815 and Shipley are not concerned with printing inks having solvents of the characteristics recited, and do not aid the von Hueckeroth disclosure as an anticipation of either a coating composition or a printing ink. Von Hueckeroth, while containing a disclosure of butyl carbitol, does not suggest the use of this solvent for either a coating composition or a printing ink; while the other two references, containing as they do a disclosure of solvents with high vapor pressures and high volatility at room temperature, do not suggest the use of a solvent having the characteristics of butyl carbitol for either of them. There is no proper ground for applying these references by substitution as no one of them suggests the teaching of applicant's invention.

In Kulp vs. Bridgeport Hardware Co., 19 Fed. (2) 630, Judge Thomas said:

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> * * * * * in order to negative invention in a novel combination, it is necessary to find in the prior art, not merely a construction which might be modified to make the device at bar, but somewhere a suggestion, not only that the modification should be made, but how to make it".

This view of the patent law is well recognized and the Examiner will readily perceive that it vigorously disapproves a combination of unrelated patents, as are those cited in the present case, to construct a retrospective anticipation.

There is no principal reference which suggests that the Examiner's proposed modification should be made, or how it can be made. Independent features of each reference must be chosen and their relation to each other is not suggested except by applicant's own disclosure. It is felt that the combination of references is both improper and unfair, and in derogation of Sec. 4886 R. S.

Specifically, Celanese No. 96,759 is concerned with a fabric-marking ink having a solvent possessing a very high vapor pressure at room temperatures; British No. 335,074 is for a lithographic printing process in which water-repellant solvents are employed which have low vapor pressures at room temperatures, but whose vapor pressure curves do not rise markedly when subjected to elevated temperatures; these references contain no suggestion that solvents like butyl carbitol, having practically no vapor pressure at room temperatures but which vaporize rapidly at elevated temperatures, may be used to dissolve cellulose compounds or resins and formed, with a color, into a composition having qualities of tack and viscosity of a printing ink, nor do they contain any suggestion of the new and useful, indeed the startling results to be obtained by their use in the printing art. And von Hueckeroth doesn't even suggest that the compound he has listed can be used effectively as a coating composition, much less a novel printing ink, where the results of its use would be far more than what von Hueckeroth or any person skilled in the art would have expected. These results are fully stated in the specification and were thoroughly discussed in the last amendment.

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The addition of the subsidiary features of the references, such as the use of chrome yellow in Colmecs and the listing of dibutyl phthalate as a plasticizer on page 109 of von Hueckeroth, does not aid in remedying the primary lack of anticipation apparent in these references. The fact that the Examiner is compelled to single out these additional features merely emphasizes the lack of a coherent understanding of applicant's invention by prior art workers.

British patent No. 388,074 is for a lithographic printing process in which the predominant portion of the solvents and oils employed are chosen for their water-repellant characteristics, and which differ widely from the solvents used in the Gessler invention. Most of the solvents of the British patent possess no marked rise in their vapor pressure curves on elevated temperatures. The drying, therefore, of the inks in which they are used cannot be accomplished by exposing the prints to elevated temperatures. This, however, is what is accomplished in the Gessler invention and the heating step brings about an almost instantaneous evaporation and effectively dries the ink. This important feature of the present invention contrasts sharply with the process of the British patent which requires drying by the slow, time-taking adsorption of the solvents into the fibers of the paper. The advance over the teaching of the British patent is unmistakable.

Lawrence is cited as showing the use of carbitol in conjunction with ethyl cellulose and castor oil. Carbitol (diethylene glycol ethyl ether) however, is a compound chemically quite distinct from butyl carbitol which is diethylene glycol butyl ether, and among other distinctions possesses a vapor pressure of .13 mm. at 20° C. which is several times as great as that set forth as the upper limit in applicant's claims.

Issue is vigorously taken with the Examiner's assertion that to prepare an ink by mixing the compound listed on page 108 and that listed on page 149 of von Hueckeroth, does not amount to invention. To be sure, the composition of such an ink, as a fait accompli, is simple,

but simplicity does not negative invention. Moreover, von Hueckeroth does not suggest that this composition should be made, or how to make it; and the new and useful results accruing are such that it is incontrovertible that von Hueckeroth did not contemplate them.

The amendments to the specification inserted by the present amendment are merely explanatory of subject matter the gist of which has already been disclosed. If the Examiner desires a supplemental oath under Rule 48, the same will be submitted.

It is respectfully suggested that the Examiner is not viewing this applicant's invention in the light of the prior art, but on the contrary is viewing the prior art in the light of the present invention. It is submitted that this viewpoint is improper, and that an anticipation constructed from it is not only synthetic and imaginary, but has been disapproved by the Patent Office tribunals and the Courts.

In view of the above, favorable reconsideration is thought to be in order.

Respectfully submitted,

Charles Holland

Attorney for Applicant.

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Room 4708

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

Paper No. 6

80/he

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Charles J. Holland,
420 Lexington Ave.,
New York, N. Y.

Applicant: Albert E. Cessler
Ser. No. 622,453
Filed July 14, 1932
For Printing Ink and method of utilizing same.

MAILED
JUN 4 1934

In response to amendment filed Mar. 13, 1934.

Additional references cited:

Lawrence (filed Feb. 20, 1930)	1,954,450	Apr. 10, 1934	41-33
Reese (filed June 2, 1932)	1,924,961	Aug. 29, 1933	41-33
Lawrence	1,858,673	May 17, 1932	41-33
Reese (filed Nov. 2, 1931)	1,893,765	Jan. 10, 1933	41-33

Page 3, line 8, amendment B[4], "200" should have either "F" or "F." inserted thereafter.

Claims 11, 12 and 14 are rejected as too broad as all cellulose compounds and cellulose esters do not dissolve in butyl carbitol, and in the Davidson article on glycol ethers in the July, 1926, number of Industrial and Engineering Chemistry referred to by applicant, it is stated on page 671 that cellulose acetate is insoluble in butylether of diethylene glycol. Accordingly these claims are so broad as to include inoperative cellulose compounds and esters.

Accordingly the only operative cellulose ester disclosed is nitrocellulose and the claims should be restricted thereto.

Claims 11, 13 and 14 are rejected as readable upon Lawrence, 1,954,450, a recent patent, who discloses making a printing ink containing synthetic resin, diethylene glycol butyl ether, and a pigment.

Claims 12 and 15 are rejected as substantially met by 1,954,450 in view of applicant stating on page 4, lines 3 to 5 that nitrocellulose may be replaced by synthetic

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resins, which are obviously equivalents.

Reese 1,924,961 also shows using resinous material with butyl carbitol, and also uses nitrocellulose, and note page 4, lines 101 to 112. So apparently synthetic resin and nitrocellulose are equivalents in the art. In 1,858,673, Lawrence discloses the use of both a cellulose compound and a synthetic resin with butyl carbitol.

The addition of a plasticizer such as dibutyl phthalate is old as stated in the last Office action, Lawrence 1,899,420, of record shows the use of tricresyl phosphate which is a low volatile solvent similar to dibutyl phthalate and to add these well known plasticizers is not thought to be patentable especially as no definite percentage is added and a very small amount would thus be included by the terms of claim 15. Reese, 1,893,785, shows the use of tricresyl phosphate, diamylphthalate, and diethyl phthalate as plasticizers together with dissolved cellulose esters, so apparently the selection of any of these well known plasticizers is a matter of choice.

J. M. Dennison

Examiner.

MAIL DIVISION
-4 34
U.S. PATENT OFFICE

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Div. 64 Room 4708
ALBERT E. CHESLER
PRINTING INK AND METHOD
OF UTILIZING SAME
Serial No. 682,453
Filed July 14, 1933.

New York, June 8, 1934.

HON. COMMISSIONER OF PATENTS,
Washington, D. C.

S i r : -

Supplementary to the amendment dated March 12, 1934, please add the following claims:

16. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material incorporated in a vehicle consisting of low viscosity materials selected from the group comprising cellulose compounds that are solid, coherent and non-sticky when solvent free and resins, dissolved in solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration of a lacquer~~, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

17. A printing ink sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures, comprising a coloring material incorporated in a vehicle consisting of low viscosity cellulose esters that are solid, coherent and non-sticky when solvent free, dissolved in solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink ~~as contrasted with the characteristically low concentration~~ of a lacquer, such solvents having a vapor pressure of 760 millimeters of mercury at 200° C. or higher and not more than approximately .05 millimeters of mercury at 20° C., and having the property of evaporating rapidly at elevated temperatures, said ink being thereby adapted to form a print that dries rapidly on heating.

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REMARKS.

The above claims have been added in order to remove the expressions indicating that the applicant's invention is limited to the use of neutral organic solvents. Upon referring to the specification, the Examiner will find ample disclosure to support the applicant's broad teaching of a new and useful printing ink in which a coloring material is incorporated in the vehicle containing solvents having peculiar characteristics stated. As applicant is the first to produce this new and useful printing ink and the first to teach the principles underlying its preparation and use, it is felt that there is no basis for his limiting himself to the use of the particular class of solvents which he has chosen to mention in his specification for purposes of illustration.

In the interview with the Examiner in the early part of March, the latter indicated the necessity of applicant including in his claims a recital of these neutral organic solvents; yet, so far as applicant is aware and so far as the record shows, there is no reference which makes it incumbent upon applicant to limit his invention to this extent. By a review of the specification it is believed that the Examiner will readily perceive that applicant is clearly entitled to claims of the scope thus presented by this amendment, and it is believed that these claims w' be found allowable along with those previously discussed with the Examiner and in principle agreed upon as containing allowable subject matter.

A short while ago the Washington associate of the attorney of record called upon the Examiner and called his attention to the fact that every effort had been made to place this case in condition for allowance and that in view of this fact the case was entitled to preference under Commissioner's Order No. 3084. Apparently the Examiner has not seen fit to act upon the case out of turn, but inasmuch as the case comes up for its regular turn on or about the 15th of June, it is

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believed that an early allowance should in all fairness be given.

Respectfully submitted,

Charles J. Holland

Attorney for Applicant.

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Div. 64 Room 4708 DEPARTMENT OF COMMERCE Paper No. 8

Address only "Commissioner of Patents, Washington, D. C." and not to any officer by name. SC/hb

UNITED STATES PATENT OFFICE WASHINGTON

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Charles J. Holland,
420 Lexington Ave.,
New York, N. Y.

Applicant: Albert E. Gessler
Ser. No. 622,453
Filed July 14, 1932
For Printing Ink and Method of Utilizing Same.

MAILED JUN 5 1934

In response to amendment filed June 4, 1934.

This action is supplementary to the office action of June 4, 1934, as applicant's supplementary amendment of claims 16 and 17 had not been received in the division when the last office action was mailed.

Claim 16 which is similar to claim 11 except that the solvents are more broadly claimed is rejected similarly thereto, as too broad and as unpatentable over Lawrence 1,954,450, of record.

Claim 17 which is similar to claim 12 except that the solvents are more broadly claimed is rejected similarly thereto, as too broad and as substantially met by 1,954,450.

The application has not been acted on out of order as it is not in condition for allowance in view of recent art discovered in another division.

Examiner.

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LW

IN THE UNITED STATES PATENT OFFICE.

Div. 64, Room 6708;

Application of Albert E. Goodier;

Ser. No. 688,489;

Filed July 14, 1933;

For Printing Ink and Method of Utilizing Same.

U. S. PATENT OFFICE
RECEIVED
AUG 1934
DIVISION 64

New York, August 27, 1934.

Hon. Commissioner of Patents,

Washington, D.C.

Sir:

In response to the Office action of June 5, 1934, please amend the above-entitled application as follows:

Rewrite the amendment previously entered in page 2, line 8, after "raised", as follows:

- In other words, such solvents boil on elevation of the temperature to say 200° C. or higher, and the vapor pressure increases to 760 millimeters of mercury. -

Add the following claims:

- 18. A quick-drying printing ink, comprising a coloring material incorporated in a vehicle consisting of low viscosity materials selected from the group comprising cellulose compounds and resins, that are solid, coherent and non-sticky when dry, dissolved in a solvent in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink, said solvent having a vapor pressure at elevated temperatures sufficient to cause the same rapidly to vaporize and thereby to dry the ink, but having a vapor pressure at room temperatures of approximately .05 millimeters of mercury.

19. A quick-drying printing ink, comprising a coloring material incorporated in a vehicle consisting of

low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink, said solvent having a vapor pressure at elevated temperatures sufficient to cause the same rapidly to vaporize and thereby to dry the ink, but having a vapor pressure at room temperatures of approximately .05 millimeters of mercury, said vehicle comprising also a solvent which has no appreciable vapor pressure at room temperatures.

20. A quick-drying printing ink, comprising a coloring material incorporated in a vehicle consisting of nitrocellulose dissolved in diethylene glycol butyl ether in concentration sufficient to produce ~~a liquid composition having~~ the normal qualities of tack and viscosity characteristic of a printing ink.

21. A vehicle for printing ink, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in solvents having a vapor pressure at elevated temperatures sufficiently high to cause the same rapidly to vaporize and thereby quickly to dry the vehicle by evaporation, but having a low vapor pressure at room temperatures of approximately .05 millimeters of mercury, said vehicle being sufficiently free from highly volatile solvents as to be substantially non-drying at room temperature.

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22. A vehicle for printing ink, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in solvents having a vapor pressure at elevated temperatures sufficiently high to cause the same rapidly to vaporize and thereby quickly to dry the vehicle by evaporation, but having a low vapor pressure at room temperatures of approximately .05 millimeters of mercury.

23. A vehicle for printing ink, comprising nitrocellulose dissolved in diethylene glycol butyl ether.

24. A vehicle for printing ink, comprising nitrocellulose dissolved in diethylene glycol butyl ether in concentration sufficient to produce a liquid composition having the normal qualities of tack and viscosity characteristic of a printing ink vehicle.

25. A vehicle for printing ink, comprising nitrocellulose dissolved in diethylene glycol butyl ether in concentration sufficient to produce a liquid composition having the normal qualities of tack and viscosity characteristic of a printing ink vehicle as distinguished from the characteristically low concentration of a lacquer vehicle.

26. A quick-drying printing ink vehicle, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent having a vapor pressure at elevated temperatures sufficient to cause the vehicle to dry rapidly by evaporation, but having a very low vapor pressure at room temperatures.

27. A quick-drying printing ink vehicle, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent having a vapor pressure at elevated temperatures sufficient to cause the vehicle to dry rapidly by evaporation, but having a vapor pressure at room temperatures of approximately .05 millimeters of mercury.

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28. A quick-drying printing ink vehicle, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink vehicle, said solvent having a vapor pressure at elevated temperatures sufficient to cause the vehicle to dry rapidly by evaporation, but having a very low vapor pressure and evaporation rate at room temperatures.

29. A quick-drying printing ink vehicle, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent having a vapor pressure at elevated temperatures sufficient to cause the vehicle to dry rapidly by evaporation, but having a very low vapor pressure at room temperatures; said vehicle containing also a solvent which has no appreciable vapor pressure at room temperatures.

30. A vehicle for printing ink, comprising nitrocellulose dissolved in diethylene glycol butyl ether, and admixed with dibutyl phthalate.

31. A quick-drying printing ink vehicle, comprising low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent having a vapor pressure at elevated temperatures sufficient to cause the vehicle to dry rapidly by evaporation, but having a very low vapor pressure at room temperatures; said vehicle being sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures.

32. A quick-drying printing ink, comprising a coloring material incorporated in a vehicle consisting of low viscosity materials selected from the group comprising cellulose compounds and resins dissolved in a solvent which has a vapor pressure at elevated temperatures sufficient to cause the same rapidly to vaporise and thereby dry the ink, but which has a vapor pressure at room temperatures so low as to render the ink substantially non-drying at such temperatures.

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REMARKS.

It is noted that the Examiner has withdrawn from the successive positions taken in the actions of December 27, 1932, and September 15, 1933, and cited a new set of references from Class 41, Sub. 35, Ornamentation, Surface Type, Transfers. It is believed that these references are from a totally non-analogous art and are of less anticipatory value than those upon which the previous rejections were predicated.

The Examiner has objected to claims 11, 13 and 14 as too broad in view of the fact that all cellulose compounds and cellulose esters do not dissolve in butyl carbitol. Applicant is in entire agreement with the Examiner as to his premise but not as to his conclusion. If the Examiner will refresh his recollection of the claims, he will perceive that they call for a printing ink in which certain substances, including cellulose compounds and/or resins, are dissolved in solvents, the characteristics of which are very clearly and definitely stated. True, certain cellulose compounds cannot be dissolved in these solvents, but such compounds are not claimed, for they do not answer the requirement of being compounds dissolved in such solvents. In other words, applicant is only claiming as constituents of his ink cellulose compounds and/or resins which do dissolve and are dissolved in the solvents specified.

Applicant has disclosed on pages 2, 3 and 4 of his specification that it is possible to make a printing ink in which certain cellulose compounds and/or resins may be dissolved in a certain type of solvent and that certain new and useful results obtain. This teaching is in no way limited to the use of the particular cellulose compound given for purposes of illustration. If this were not the case, applicant would be precluded from relying upon the doctrine of equivalents and some futu experimenter in naming a compound which applicant did not specifically allude to, would be encouraged to claim as his invention that which clearly comes under the present applicant's inventive teaching. It is believed that the Examiner does not desire to place an interpretation upon the patent law which would lead to such an unjust and inequitable

result, and will, therefore, not insist that applicant limit himself to the use of nitrocellulose in the composition of his ink.

Claims 11, 13 and 14, to which the Examiner applies the Lawrence patent 1,954,450, are not at all met by it. The claims call for a printing ink comprising substances dissolved in solvents in sufficient concentration to give the normal qualities of tack and viscosity of a printing ink, and not for a marking composition of the fusible type composed of solid waxy materials, and which must be applied to a transfer sheet in heated condition and under heavy pressure. Lawrence is illustrative of this latter type composition, and the whole Lawrence process is predicated on the idea of making a marking composition which will keep relatively plastic on the transfer sheet until such time as the whole composition is transferred to a base, which is likewise accomplished by means of heat and pressure applied simultaneously. Such a process is so differently designed and operated and gives such different results that it contains no teaching whatever analogous to that of the present invention. The Lawrence patent is directed to the problem of making and aging ornamental transfers for marking fabrics, and the stated object of the patentee is to provide a substitute for beeswax as a constituent of the transfer compositions usually desired in that art. Beeswax is desirable in that art because it forms a film over the transfer composition and prevents it from drying. As a substitute for beeswax he proposes a combination of a phenolic condensation product and ozokerite together with a blown oil. These three ingredients must be fused together under heat, as they are not miscible or soluble at ordinary temperatures, and after the melted composition is made it is mixed with other materials which happen to include a solvent which Lawrence thinks is butyl carbitol, a substance which applicant concedes he did not invent. Coloring material is then admixed and the composition is then "panned", which means that it is allowed to solidify in a pan. This composition of Lawrence can only be utilized by heating it to fluidity and then forcing it against the transfer sheet by pressure. After it has been so applied, the composition must be

dried for 24 hours in order to allow the aforesaid film to form.

Such a composition is in no way similar to that of applicant's and could not be used as a printing ink which is applied at ordinary temperatures by pressure but which, in the present invention, is very quickly dried not by oxidation or polymerization, but by evaporation induced by the subsequent application of heat, a procedure which is new in the printing art for the simple reason that it has heretofore not been known how to make printing inks which would respond to this evaporating treatment and yet satisfy the exact requirements of tack and viscosity, etc., for printing inks. The idea of Lawrence is not to provide an ink which will dry immediately by evaporation upon the application of heat, but to provide a marking composition on a transfer sheet which will remain plastic indefinitely and which is protected from complete oxidation or evaporation by a surface film of dried or polymerized material in order to give the same result as the beeswax of the prior art. This is in keeping with the generic idea of ornamental transfers for fabrics and very sharply contrasts with the purpose desired in commercial printing upon paper. It is very plain that not only is Lawrence's purpose unmistakably different, but also is his mode of operation and his result.

Incidentally, it is pointed out that the Lawrence disclosure is so conflicting in respect of the explanation of the action of butyl carbitol that it raises a strong suspicion as to the value of the contribution of the patentee even in his own art. Lawrence's discussion of butyl carbitol is so jumbled and unintelligible that it is obvious that he misunderstood its characteristics. For he says that he wants a solvent which will not evaporate readily and states that butyl carbitol at 100°C. has so high a vapor pressure that it does not evaporate with sufficient rapidity to vary the composition of the marking material. And he goes on to state that some solvents have high boiling points, but because of their low vapor pressure at 100°C. they evaporate too readily. If the Examiner can explain the Lawrence disclosure in this respect,

applicant will appreciate it. It is believed, however, that it is not possible to credit Lawrence with any clear idea of the reasons underlying the use of butyl carbitol in his own transfer composition; much less is it possible to find in Lawrence anticipation of the inventive concepts involved in the production of applicant's printing ink.

The Lawrence patent is also relied upon by the Examiner as anticipating claims 12 and 15 on the basis that applicant has noted an equivalency of synthetic resins or nitrocellulose in his illustrative composition. But the premise that applicant has conceded this equivalency of constituents in his own ink, does not and cannot lead to the conclusion that the substitution of nitrocellulose for the resins of Lawrence would produce applicant's printing ink either as described or as claimed. For applicant requires such cellulose esters or resins to be dissolved in solvents of sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink, such solvents having definite characteristics which will cause the print to dry rapidly on heating. The fact that the illustrative nitrocellulose in this new composition of applicant may be replaced by synthetic resins does not shift this invention into the ornamental transfer art, and the Lawrence patent is just as irrelevant if his fusible marking composition is made up with nitrocellulose as it is when the same is compounded with an artificial resin. The composition of Lawrence is not designed for the purpose, does not function in the manner and does not produce the results which applicant has in mind and which he has achieved.

The Reese patent, 1,924,961, is likewise directed to the art of ornamentation, but in this case the purpose of the patentee is to unite a prehardened decorative film with a base surface in such a manner as to adapt his transfer operation to quantity-production methods. With this in mind the patentee provides a special bonding medium which will unite with a transfer coating of the lacquer type, the latter being

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a coating which dries very quickly because of the highly volatile solvents which are incorporated in it. A specific example of the bonding medium, which serves to hold the design coating to the base, is chosen by the Examiner as anticipatory of applicant's printing ink. This bonding coating, like Lawrence's marking composition, does not have the same purpose, the same function, nor the same result as those desired and obtained by applicant. This bonding medium contains large quantities of solvents having high vapor pressures at room temperature, such as butyl acetate, butanol, ethyl lactate, and toluol, and the fact that it contains also a small quantity of butyl carbitol is of no significance whatever in so far as the present invention is concerned. The Reese bonding medium is not a printing ink and could not be used as such.

In connection with the Reese patent, the Examiner observes that synthetic resin and nitrocellulose are equivalents in the art. Unquestionably, they are equivalents in the ornamental transfer art, but they were not equivalents in the printing ink art until applicant suggested them, for the simple reason that it has heretofore been impossible to use these substances in the printing ink art. They have never been considered a part of the printing ink art. The known use of these substances in connection with a particular composition of one art does not amount to an anticipatory teaching of their use in a totally different composition in the other art, particularly when they have not been, and could not have been, used in that other art.

The Examiner also observes that Lawrence, 1,858,673, discloses the use of both a cellulose compound and a synthetic resin with butyl carbitol. But his composition includes so many other ingredients the nature of which is inconsistent with the purposes of applicant's disclosure that the patent has no significance in so far as concerns the present invention.

In connection with this second Lawrence patent it should be noted that the idea of the patentee is to provide a slow-fusing

composition for the primary element of the transfer and an easily-fusible composition for the background, and it is solely in the composition of the primary element that he uses his monoethyl ether of diethylene glycol solvent. This primary element is similar to applicant's in neither purpose, function nor result, and the solvent alluded to as butyl carbitol is in fact not such.

It should be remembered that the primary coating disclosed in the Lawrence patent, 1,888,765, is designed for the special purpose of uniting it to a background of relatively fusible compounds previously applied to the fabric base. This primary coating could not be used for printing ink, as the type of surface to which printing is customarily applied is not provided with the background composition which Lawrence requires in order to cause his primary element to adhere.

The Examiner's observation that the addition of a plasticizer such as dibutyl phthalate is old and does not amount to invention is queried. To what compound of the art does the Examiner refer in suggesting this addition? It is not seen that there is any sense of contending that applicant's product is anticipated merely because these plasticizers (which are admitted to be old as such) are added to dissimilar prior-art compositions, and so long as there is no composition in the art which anticipates applicant's invention without the use of a plasticizer, it cannot be said that applicant has followed any prior-art teaching by adding such plasticizer to such composition.

As the Examiner has observed, the Reese patent 1,893,786 shows the use of triaresyl phosphate, diamylphthalate, and diethyl phthalate as plasticizers, together with dissolved cellulose esters. But these plasticizers are not dissolved in solvents such as those necessary to the utilization of applicant's invention. The compounds in which these plasticizers are used are for use in constructing a transfer film and not for use in printing ink which must be applied permanently to the paper or other printing surface and which must dry as quickly as possible.

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The compounds in this patent all contain large quantities of solvents such as toluol, methyl cellosolve, diacetone alcohol, ethyl acetate, butyl acetate, butanol, butyl alcohol, cellosolve, and butyl cellosolve, which have a high vapor pressure at room temperature. The presence of these solvents are in direct antagonism to the whole purpose and function of the present invention and, of course, are inimical to the results desired.

After referring to the Reese patent and showing various plasticisers dissolved in cellulose esters, the Examiner finds it easy to conclude that the selection of any of these well-known plasticisers is a matter of choice, but it is thought that this conclusion unfairly detracts from the present invention. For, while the selection of any of these plasticisers may be a matter of choice to users of the Reese process, and are to be considered as equivalents to the substances suggested by Reese for his transfer film, the use of these substances in applicant's ink amounts to invention because the ink is designed for a different purpose, functions in a different way, and produces a different result from those connected with the compounds suggested by Reese. And the different result is beyond question a useful one. It is conceded that the present applicant did not invent plasticisers, but he did invent a new ink, and the fact that certain of the plasticisers he uses are old per se does not at all militate against the novelty of his ink, nor against the basic ideas underlying its composition.

Claims 16 and 17 are rejected as being too broad. If the Examiner means that they are too broad in view of the objections previously noted in connection with claims 11, 12 and 14, this contention has been effectively answered by the statement that applicant is not claiming those compounds which do not dissolve in the solvents specified. If the Examiner means that claims 16 and 17 are too broad in view of any reference other than Lawrence, it is requested that such reference showing them to be broad be cited. The basic nature of applicant's contribution is felt to warrant broad claims, and the cited art more than confirms this belief.

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Claims 18 and 12 are also rejected as substantially met or as unpatentable over Lawrence No. 1,964,450, and for the reasons previously advanced it is believed that this rejection is highly improper and should be withdrawn.

Applicant is somewhat puzzled over the course of the prosecution of this case. Each effort he has made to overcome a combination of reasons and references cited has been met with an acknowledgment of his argument but with a shifting on the part of the Office to another totally different group of references and grounds of rejection, and each new group and ground clearly evidences that an additional search has been necessary to bolster up the rejection originally made. In the last action, applicant made every effort to comply with every requirement and objection noted by the Examiner, and he indicated very clearly his desire to terminate the prosecution of the case. Indeed, he was led to believe that his proposed amendments were adequate to put the case in allowable condition. The Examiner's new rejection upon clearly irrelevant references seems to have been made for the purpose of postponing the issue merely, and a consideration of the remote art and non-analogous art cited tends to confirm this conclusion. It is respectfully requested that bona fide action on the merits be given with a view to according to applicant the protection which the Patent Statutes were designed to afford him.

New claims have been added in order to cover the field which the references show clearly to be unexplored by any previous worker in the art. These claims all include the distinctions noted in the above discussion and are thought very clearly to be allowable. Some of these claims are directed toward the vehicle for the ink, which is part and parcel of the invention of this applicant. The ink cannot be made without the vehicle. The invention of the ink and that of the vehicle are thought clearly to be dependent inventions and are properly to be claimed under the provisions of Rule 41.

Respectfully submitted,

Charles Hovland

Attorney for Applicant

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Art. 64 Room 4708

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name

SC/he

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

Paper No. 10

All communications regarding this application should give the serial number, date of filing, and name of the applicant

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Charles J. Holland,
420 Lexington Ave.,
New York, N. Y.

Applicant: Albert E.Gessler

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink and
Method of utilizing same

MAILED
NOV 27 1934

In response to amendment filed Aug. 28, 1934.

Additional references cited:

Schneider (filed Jan. 10, 1931)	1,966,907	July 17, 1934	41-26
Fleischmann	1,787,239	Dec. 30, 1930	134-36
Doughty	1,439,696	Dec. 26, 1922	134-36

Claims 11, 12, 13, 14, 15, 16 and 17 are again rejected as unpatentable over Lawrence, 1,954,450 of record for reasons of record as these claims have not been amended. On page 1, line 5, Lawrence states thathe makesa transfer ink which may be considered broadly as a printing ink. In the Davidson article of record on pages 670 and 671, butyl carbitol is disclosed as a solvent for both resin and nitrocellulose. Middleton of record shows using either a resin such as shellac or sandarac, as well as nitrocellulose as base materials in making a printing ink. Fleischmann shows the use also of resins and nitrocellulose in printing inks, so which one is used is thought to be a matter of choice.

These claims are also rejected as substantially met by the recent Schneider patent which discloses such low boiling solvents and plasticizers such as tricresyl phosphate, diamyl phthalate and dibutyl phthalate. Reese, 1,924,961 of record as well as on page 107 of Circular 359 of record it is stated that diamyl phthalate has a very low vapor pressure. Schneider uses resin as a base material.

Claims 12, 15 and 17 which claim cellulose ester as a base material are not thought to be patentable over Schneider as whether cellulose ester or a resin is used is thought to be

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a matter of choice as previously stated.

Claims 18 and 19 are similarly rejected as unpatentable over either 1,954,450 or Schneider who use similar low vapor pressure solvents. As to 1,954,450 not having a clear disclosure of butyl carbitol, it is noted that it is specifically claimed and that it is clearly identified on page 2, lines 29 to 31 by its chemical formula and boiling point.

Claim 20 is rejected as unpatentable over either 1,954,450 or Schneider as to substitute nitrocellulose for resin is not thought to be a patentable distinction.

Claim 32 is rejected similarly to claim 20.

Claim 32 is also rejected as readable upon Doughty who uses a resin and terpineol, a solvent which has a high boiling point and dries very slowly at room temperature.

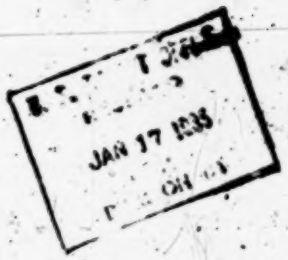
Claims 21, 22, 23, 24, 25, 26, 27, 28, 29, 30 and 31 which are drawn broadly and merely to a constituent of an ink are rejected as unpatentable over either 1,954,450 or Schneider who use resin and low vapor pressure solvents. In claims 23, 24, 25 and 30 which are limited to nitrocellulose as a base material, the nitrocellulose is not thought to be patentable over resin for the reasons stated. These claims which are not limited to a printing ink are rejected also as substantially met by the Reese patents of record who show nitrocellulose and resin having low vapor pressure solvents used which are also used by applicant. Reese shows clearly the use of low vapor pressure solvents as solvents and plasticizers for resins and nitro cellulose. Applicant claims no specific proportions and so far as the claims are concerned would include proportions such as 99% resin and one per cent of solvent which apparently would not be useful.

Examiner.

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11/E/Lea

JAN 16 35



Div. 64 Room 4708
ALBERT E. GESSLER
PRINTING INK AND METHOD
OF UTILIZING SAME
Serial No. 622,453
Filed July 14, 1932.

New York, January 15, 1935.

HON. COMMISSIONER OF PATENTS,
Washington, D. C.

Sir:-

Replying to Official Letter dated November 27, 1934, applicant amends as follows:

Specification, page 1, between lines 7 and 8, insert the following:

In referring to printing inks in the specification and claims, I refer to compositions of heavy consistency used for commercial printing and not to plastic, thermoplastic, liquid, semi-liquid marking or ornamental transfer compositions which require special equipment differing from the standard plate and roller construction required for general printing purposes. Printing inks invariably are characterized by a relatively high viscosity obtained either by the polymerization of the oils by heating or by thickening by dissolving solid substances therein in order to effect well recognized qualities of tack, viscosity and heavy consistency peculiar to these printing inks, and necessary to such inks in order to enable them to be properly spread upon the plates and rollers of the printing press. These characteristics are in sharp contrast to those of special purpose marking compounds, which cannot be used on standard printing presses. It should be understood, therefore, that all compositions capable of leaving a substantially permanent mark upon a surface are not to be classed as printing inks contemplated under the present invention, unless their purpose, function and result are in line with those desired in the art of commercial printing.

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Page 1 line 8, after "inks" insert of the type so identified; line 10, change "due to" to depending upon .

Page 2 lines 9 and 29, cancel "neutral".

Page 3 line 23, rewrite amendment A- as follows:

Certain high boiling point solvents of the nature alluded to are unique also in that they not only serve to plasticize the gummy film obtained after the main solvent has evaporated, but they also exert a solvent action upon the cellulose compound or natural or syntaetic resin sought to be dissolved. Such solvents do not evaporate upon heating the compound, for they boil at considerably higher temperatures than are necessary to drive off the main solvent.

Page 4 line 5, delete the period after "drying" and add that are solid, coherent and non-sticky when solvent free.

Page 5 line 5, after "print" insert

The ink is substantially non-absorbable, does not "halo" and is not subject to "livering" or other forms of instability. The term "haloing" is a term used in the printing ink art to characterize the tendency of the vehicle of an ink to move outwardly from the print, after it has been applied. The term "livering" is used to denote the property of an ink to deteriorate and lose its characteristic consistency of body and viscosity, as by the separation or coagulation of some of the constituents of the ink after a period of standing. The prints made by the novel ink do not become so brittle that an over-print cannot later be impressed upon them. The ink does not strike through the paper to which it is applied.

Page 6 line 8, after "grease" insert in the printing,

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"The" and insert: successive sheets of printed material will not offset or stick together but the; last line, after "surface" delete the period and add in which it is first applied.

Claims 11 and 14, line 8 of each claim, cancel "neutral"; same lines after "resins" insert that are solid, coherent and non-sticky when solvent free.

Claims 11, 14 and 15, lines 7 and 8 of each claim, cancel "as contrasted with the characteristically low concentration of a lacquer".

Claims 13 and 15, line 4 of each claim, cancel "neutral".

Claims 13, 16 and 17, lines 6 and 7 of each claim, cancel "as contrasted with the characteristically low concentration of a lacquer".

Claim 12 line 4, after "esters" delete the comma and insert that are solid, coherent and non-sticky when solvent free.

Claim 13 line 3, after "resin" insert that is solid, coherent and non-sticky when solvent free; lines 5 and 6, cancel "as contrasted with the characteristically low concentration of a lacquer".

Claim 16 line 5, and claims 18, 19 and 32, line 4 of each claim, after "resins" insert that are solid, coherent and non-sticky when solvent free.

Claim 32 line 5, change "same" to vehicle.

Claim 17 line 4, after "esters" delete the comma and insert that are solid, coherent and non-sticky when solvent free.

Claims 21, 22, 26, 27, 29, 31, line 3 of each claim, after "resins" add that are solid, coherent and non-sticky when solvent free.

Claim 20 line 4, change "liquid composition having" to heavy consistency carrying.

Claim 22 line 4, after "high" add and being present in quantity sufficient; line 5, change "same" to vehicle.

Claims 26, 27 and 29, line 4 of each claim, after "temperatures" insert and being present in quantity.

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Claim 32, line 5, after "temperatures" insert and being present in quantity.

Add the following claims:

33. A printing ink having a heavy tacky consistency comprising a coloring material incorporated in a vehicle made up from a material of the group comprising cellulose compounds and resins that are solid, coherent and non-sticky when solvent free, dissolved in solvents which are substantially non-drying at room temperatures, but which have a vapor pressure at elevated temperatures sufficient to cause the rapid evaporation of such solvent, said solvents imparting to the ink the property of instantaneous drying from a thin film solely by the evaporation of such solvents upon elevation of temperatures.

34. A printing ink having a heavy tacky consistency comprising a coloring material incorporated in a vehicle made up from a solid, coherent, non-sticky and solvent free material of the group comprising cellulose compounds and resins, dissolved in a solvent which is substantially non-drying at room temperatures, but that evaporates rapidly at elevated temperatures, said solvent imparting to the ink the property of instantaneous drying from a thin film solely by the evaporation of such solvent at elevated temperatures.

35. A printing ink having a heavy tacky consistency comprising a coloring material incorporated in a vehicle made up from a solid, coherent, non-sticky and solvent free material of the group comprising cellulose compounds and resins, dissolved in a solvent which is substantially non-drying at room temperatures, but that evaporates rapidly at elevated temperatures; said vehicle being substantially free from highly volatile solvents and driers, and having the property of hardening a thin film of the ink instantaneously upon the elevation of the temperature sufficiently to drive off said solvent.

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36. A printing ink having a heavy tacky consistency comprising a coloring material incorporated in a vehicle made up from a solid, coherent, non-sticky and solvent free material of the group comprising cellulose compounds and resins, dissolved in a solvent which is substantially non-drying at room temperatures, but that evaporates rapidly at elevated temperatures, said vehicle being substantially free from highly volatile solvents and driers but containing a plasticizer, and having the property of hardening a thin film of the ink instantaneously only upon the elevation of the temperature sufficiently to drive off said solvent.

37. A printing ink having a heavy tacky consistency comprising a coloring material incorporated in a vehicle made up from a material of the group comprising cellulose compounds and resins that are solid, coherent and non-sticky when solvent free, dissolved in solvents having a vapor pressure at room temperatures of approximately .05 millimeters of mercury but having a vapor pressure at elevated temperatures sufficiently high to cause rapid evaporation of the solvent, said ink being substantially free from solvents tending to evaporate to any considerable extent at room temperatures, the drying of said ink being governed solely by the aforesaid characteristics of said solvents.

38. A printing ink having the heavy, tacky consistency of the ink required by the standard plate or rotary presses used in commercial printing, said ink comprising a coloring material incorporated in a vehicle made up from a material of the group comprising cellulose compounds and resins that are solid, coherent and non-sticky when solvent free, dissolved in solvents having a vapor pressure at room temperatures of approximately .05 millimeters of mercury but having a vapor pressure at elevated temperatures sufficiently high to cause rapid evaporation of the solvent, said ink being substantially free from solvents tending to evaporate to any considerable extent at room temperatures, the drying of the ink being governed solely by the aforesaid vapor pressure characteristics of said solvents.

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39. A printing ink having the property of being practically instantaneously dried from a thin film solely by the evaporation of its solvents upon heating, consisting of a pigment, incorporated in a varnish comprising a solvent with a vapor pressure which causes such varnish to remain in its original state of viscosity indefinitely at room temperatures, and material of the group comprising cellulose compounds and resins that become solid, coherent and non-sticky on evaporation of the solvent, said solvent having the additional property of rapid evaporation at elevated temperatures.

40. A printing ink of heavy, tacky consistency having the property of remaining in its original physical condition under the usual conditions to which printing inks are exposed but having the property of instantaneously drying from a thin film on application of heat and thereby immediately forming a solid, coherent and non-sticky print, said ink comprising a material of the group comprising cellulose compounds and resins dissolved in solvents that are substantially non-drying at room temperatures but that evaporate rapidly at elevated temperatures.

41. A printing ink comprising a coloring material incorporated in a non-oxidizable vehicle comprising a cellulose compound dissolved in solvents that are substantially non-drying at room temperatures but which are rapidly vaporizable at elevated temperatures, said vehicle being thereby adapted to dry solely by evaporation when subjected to heat.

Cancel claims 24, 25 and 28.

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REMARKS.

During a recent interview which the Examiner very kindly accorded the attorney of record, four patents to McElroy, two to Doughty and one to Schneider were produced as including subject matter anticipatory of the present invention. These patents have now been studied carefully and although their teaching has been found to differ widely from that which must be credited to the present applicant, some of the claims have been amended to remove any doubt as to the line of demarcation between these patents and the present invention. The patents are discussed below.

Schneider No. 1,966,907 is directed to the art of imitation engraving secured by printing with a non-drying ink which contains dibutyl phthalate and a resin as a vehicle. After applying the vehicle he sprinkles it with powdered shellac, which is partially dissolved by the solvent in the vehicle, and causes the shellac to penetrate the vehicle and the paper. Then he heats the assembly to 100° to 150° C. to fuse the shellac and to cause the moisture of the ink to be absorbed by the shellac instead of being evaporated.

Dibutyl phthalate has a vapor pressure at 200° C. of only 10 mm. In either applicant's process or in Schneider's process this solvent would not evaporate quickly, as its vapor pressure even at temperatures as high as 200° C. is 750 mm. below the point of rapid volatilization usually designated as the boiling point. Schneider fully realizes this and provides for the taking up of the solvent by absorption into the shellac and expressly states (page 2 lines 51-53) --

> "when the shellac is fused the moisture of the ink is absorbed by the powder instead of being evaporated".

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In contrast with this, applicant avoids the use of this solvent except as a plasticizer or repressing agent and chooses instead a solvent which will actually evaporate and will rapidly evaporate at elevated temperatures. This rapid evaporation is essential in applicant's process and the presence of the solvent which will not evaporate at room temperatures and which will rapidly evaporate on elevation of temperatures is essential to his product. As Schneider does not desire this result, does not operate his process to obtain it, and did not propose to obtain it, he certainly cannot be held to anticipate that which the present applicant has contributed. Nowhere does Schneider mention a solvent equivalent to applicant's solvents, and it is very plain that if he had suggested it or had used it, his whole invention would have been rendered inoperative for in his process this solvent would evaporate long before it had an opportunity to penetrate the paper and to secure the result which he had in mind.

Applicant's claims all distinguish his invention from that of Schneider. Even the broadest claims call for a solvent or solvents having a vapor pressure at elevated temperatures sufficient to cause the ink to dry rapidly by evaporation, and such materials are not remotely suggested by the reference. If Schneider desired to dry his composition by evaporation he would have to raise the temperature so high that he would burn his paper.

In considering the McElroy and Doughty patents, it will be well here to refresh our recollection of the fundamental principle which underlies the present invention. In commercial printing it is necessary to produce an impression which will be dry and permanent, and

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will not smudge when handled or rubbed against a foreign surface. According to the invention this is accomplished by evaporation of the solvent of the vehicle of the ink, instead of by the old method of relying upon the slow oxidation or polymerization of the vehicle or upon its absorption into the paper. It is apparent, therefore, that when the solvent has been evaporated the residue must be immediately firm, solid, coherent and non-sticky, and such result can be achieved only by the use of solid substances which are not powdery or sticky in this condition. Thus, applicant, in broadly adverting to low viscosity materials selected from the group comprising cellulose compounds and resins, has taken it for granted that members of this group which are solid, coherent and non-sticky when free of solvent will be chosen. Those not having these characteristics are useless, and as hereinafter pointed out, the McElroy and Doughty gums and resins, useful though they may be in their limited field of metallic book stamping ink, are of no value to applicant. They have not taught applicant or anyone else the principle of the present invention because these materials are normally either gummy and sticky, or else powdery and lacking in coherence. They are not solid, coherent and non-sticky when free of solvent. They will not become solid and coherent merely upon the evaporation of the solvent with which they were dissolved and are, therefore, totally unsuitable for use in a commercial printing ink to produce a hard, coherent, flexible, dry, adherent print by the evaporation of their solvent.

With this in mind we can readily perceive that McElroy No. 1,489,386 relates to a special metallic pigment ink for embossing or stamping titles on book cloth, leather, etc. McElroy uses "ester gum".

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an esterified white rosin which is brittle and powdery at room temperatures and, therefore, unsuitable for the production of a hard elastic film by solvent evaporation merely. Such a gum is fused at high temperatures and must be entirely cooled before it hardens, and it is quite apparent that it could not be used for continuous printing as it would not only be soft and would smear long after heat had been applied to it, but it would, once cooling had been effected, become hard and brittle. It cannot produce a hard, coherent, flexible, firmly adhering printing such as that produced by the ink of the present invention.

McElroy uses heated type or dies designed to supply a temperature of 500° F., which high temperature is necessary to give a metallic luster to his metal pigment, and necessary also to drive off sufficient quantities of solvent so that a print may be applied. This temperature is much higher than that which could be used in the successful operation of applicant's process; in fact, it would make the process unworkable and would burn the paper on which the print was made. Applicant prints at room temperatures and the consistency of his ink is constant.

It is significant that McElroy uses only 10% gum with 84% terpineol as his vehicle, which he mixes with two parts of bronze powder to one of gum solution. This gives a liquid composition which flows and has no similarity to a printing ink in general characteristics of consistency or specific characteristics of tack and viscosity. McElroy's vehicle contains less than one-half the amount of dissolved substances that applicant's contains and it is not surprising that McElroy obtains a light liquid consistency differing greatly from a printing ink in physical characteristics, and unusable as such. McElroy agrees with this, for he expressly describes his composition as semi-liquid.

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It is apparent, therefore, that applicant's ink would not work on McElroy's press because the ink would immediately cake and dry on the heated dies, and McElroy's ink would not work on the ordinary printing equipment contemplated by applicant because the composition of McElroy is not of sufficiently heavy consistency enough to enable it to be handled like ordinary printing ink. In other words it does not possess the qualities of tack and viscosity of printing ink, and does not meet applicant's claims either in terms or in teaching.

The real teaching of McElroy is concerned with metallic inks only, the metal pigments of which would corrode and tarnish if acid materials were used to compound them. McElroy wants a lustrous finish which he cannot obtain if his metallic pigments become tarnished. To prevent corrosion and tarnishing, McElroy uses a non-acidic binder, -- esterified white rosin -- and a solvent neutral as to acidity -- terpineol. These concepts are far removed from those underlying the present invention. Applicant is not concerned with acidity and need not choose special materials of non-acidic nature. He does not require metallic pigments, and does not require a lustrous print. He does not produce an unstable composition in which the color settles, as is the case with McElroy's metal powders. He does not use sticky resins which will smear in an ink film unless and until thoroughly cooled and hardened; nor does he use brittle powdery material that will crack and crumble when cooled to normal temperatures. He does not contemplate, nor could he utilize, a hot die apparatus for applying his ink. Moreover, terpineol, the solvent of McElroy, is not a good solvent for hard resins and cellulose compounds and would not, even if McElroy had desired it to do so, dissolve them in sufficient amounts to give the consistency desired for printing inks.

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These many points of distinction show clearly the complete inadequacy of the McElroy teaching to anticipate that of the present applicant.

In his next patent, No. 1,450,692, McElroy follows out the same general ideas of his former one but suggests "Cumar" resin as a binder and pine oil and rosin oil as solvents. Cumar resin can be obtained in solid or liquid state, but even the solid forms are sticky at room temperatures and must be chilled to reduce them to powder as McElroy prescribes. Such a resin is, therefore, unsuitable for use in a printing ink designed to produce a rapidly drying film by evaporation alone. The proportions of ingredients are substantially the same as set forth in the former patent, there being only 16% resin in the vehicle, an amount totally insufficient to give the characteristics of tack and viscosity of a printing ink.

McElroy No. 1,489,357 is specific to his particular composition and for this reason was taken as one which would, if followed closely, produce a product with which applicant's product might be compared. Accordingly, tests following the McElroy patent precisely, using the exact percentages of material recommended by the patentee, were carried out and the results showed a composition of a liquid consistency, far too liquid to approach the tackiness and viscosity of a normal printing ink and far too liquid to be capable to use with the usual printing equipment for commercial printing upon paper.

The results of these tests and the comparison of the McElroy composition with that of Gessler are described in the affidavits of Dr. F. G. Zinsser and Dr. Alfred Burger which accompany the present amendment. These show conclusively that the McElroy metallic ink is really not comparable with that of the present invention in physical characteristics, and the proper tack and viscosity, which are the main factors determining the consistency of the ink, can be obtained in McElroy's ink only if at least seventeen times as much resin is used; and

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even if this were done, the stickiness inherent in the hot composition, containing as it does fused Cumar resin, would make it impossible to print consecutively with it, a test which, naturally, must be passed in order that any product might qualify as a substitute for applicant's composition. McElroy himself warns against the use of 20% Cumar or over as it tends to clog the impression member of his particular apparatus. In sharp contrast, applicant cannot use as little as 20% solids, and produces a composition in which he may use 35% dissolved substances, as shown by his illustrative example using nitrocellulose. Thus, it is apparent that McElroy has entirely insufficient dissolved solid substances to give him the characteristics applicant desires, and if McElroy increased his solids concentration, he would render his composition inoperable even for the purpose for which he himself designed it. McElroy himself warns against such increase.

The exhibits accompanying the affidavits show very convincingly the heavy tacky consistency of an ordinary printing ink and the light, liquid consistency of the McElroy stamping composition. If the Examiner will spread samples of these inks on a piece of paper, he will readily perceive how the liquid ink, which represents the consistency of McElroy's ink as well as many other types of special inks, could not be spread upon the plates of the press. He will also observe how the vehicle strikes through and stains the other side of the paper and how it tends to "halo" and how the metal pigment settles to the bottom and necessitates remixing. Certainly, applicant is claiming very definite physical attributes and characteristics.

The other McElroy patent No. 1,471,746 merely serves to emphasize the fact that this patentee has taught the production only of a special gold color or other metallic pigment ink which must be used with a special neutral vehicle and a neutral binder in a special heated-die type of printing equipment. With the cellulose compounds and resins that may be acidic, his composition would not work and he

has taught the art nothing as to the behavior and the treatment of non-metallic pigments and materials of the group comprising cellulose compounds and resins that are solid, coherent and non-sticky when free of solvent, for use with commercial printing processes and equipment.

The Doughty patents Nos. 1,439,695 and 1,439,696 are directed to subject matter very similar to that of the McElroy patents and were issued to the same assignee. The first Doughty patent was filed before the first McElroy patent and quite plainly chronicles the initial development of the book-binding printing to which all the patents are directed. This is plain when it is considered that the Doughty patents do not allude to neutrality in any of his constituents -- the pigment solvent or binder -- and, although some of the solvents mentioned by him are within the group subsequently identified by McElroy as neutral solvents, many of the solvents mentioned contain acid radicals and are acid in nature and would not work according to the later and accepted theories of McElroy. The binder or thickening agents suggested by Doughty are rosin, dammar, copal, Burgundy pitch, Canada balsam, etc., which are not solid, coherent and non-sticky when free of solvent at or above room temperatures. Moreover, the ratio of gum to solvent is 1 to 4 and yields a light consistency sharply distinguishable from that of the printing ink as defined by applicant. Doughty's work, therefore, is significant only to show still more clearly the fact that this special metallic book-binding printing composition is limited in its application to the specific problems which were confronted in that art, and that neither Doughty nor McElroy contributed anything of value to the art of standard commercial printing.

At the interview above alluded to, the Examiner suggested the limitation of applicant's claims to a specific proportion of ingredients used. But a review of the art in contemplation at that time shows quite plainly that applicant should not be required to so limit his

claims. Such changes in the claims as have been made in the present amendment have been made merely to remove the possibility of doubt as to the distinctions between the invention and the work of Doughty and McElroy, and in view of the foregoing remarks it is felt that the Examiner will readily perceive the existence of these important and practical differences.

The foregoing amendments and remarks were prepared prior to the receipt of the Official Action of November 27, 1934, in which it was noted that the Examiner concluded not to cite the McElroy patents. Owing to their similarity to Doughty, the foregoing has not been changed and the remarks directed to McElroy have been retained in this amendment with the request that the Examiner consider them in connection with the Doughty patents. Attention is particularly directed to the fact that the addition of rosin oil to the solvent, while not suggested by Doughty, is more favorable to Doughty as an anticipatory reference, for it serves to some extent as a plasticizer (according to McElroy) and, therefore, supplies to Doughty an element which he lacks. Attention is also directed to the fact that rosin, the gum of Doughty, is sticky, when free of solvent, and, therefore, quite as unsuited as those of McElroy for the formation of a print by evaporation of a solvent merely. Moreover, Doughty uses 4 parts solvent to one of rosin and the consistency of his composition is undoubtedly just as liquid as McElroy's.

In the action of November 27th, Lawrence No. 1,984,480 is again applied to the claims. With a view toward finally disposing of this reference, the Examiner's attention is directed to the following points:

(1) Lawrence's composition is a transfer ink of a peculiar type and not a printing ink. The specification has now been amended to

define what applicant means by a printing ink and in the light of this definition it is believed that the inadequacy of compositions like those of Lawrence to anticipate the purpose, function and result of applicant's printing ink will be unmistakable.

(2) Most of applicant's claims require his cellulose compounds or resins to be dissolved in his solvents in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink. This, of course, refers to the qualities of the ink at room temperatures, and if the Examiner requires it, this limitation might be expressly included. Lawrence's composition does not meet these requirements, for at room temperatures his composition is a solid cake, by reason of the large amount of solids and small amount of solvent which he uses. Thus, Lawrence, unlike McIlroy, Doughty, Reese, etc., goes too far on the score of solids concentration and produces a composition that at room temperatures is so thick that it could not be used as a printing ink. But Lawrence can afford to retain these characteristics, for his composition is thermoplastic and he knows he must heat it to 100° C. to print his transfer. Applicant could not print at 100° C. with applicant's ink by Lawrence's process any more than Lawrence could print with Lawrence's ink at room temperatures by applicant's process. Lawrence's idea is adapted solely to the hot printing of ornamental transfers which is entirely non-analogous to the art of commercial printing at room temperatures, with which art applicant is concerned. The respective processes are mutually exclusive as are the products which are used.

(3) Lawrence contemplates only a small proportion of solvent in his composition and this is one reason why his composition is too stiff to print with at room temperatures. Even with his hot printing he states that it requires ¾ hours to evaporate sufficiently, and even then the result is a plastic composition or transfer which must remain heated in the operation of transferring the design to the fabric

or other medium to which it is adapted to be fixed permanently. The fact is that Lawrence wants his composition to remain plastic on his transfer sheet, and that he does not want it to dry and, as he uses considerable quantities of lithographic varnish and oxidizable oils, it is apparent that he relies partly on the oxidation or polymerization of these oils and it is not possible to dry his ink by the evaporation of the solvent merely. Obviously, this is not the way applicant's ink works; it is not the way it is intended to work and it does not give the results applicant has in mind. The teaching of Lawrence is not such as would aid the art of commercial printing at all, much less is it sufficient to anticipate the real contribution that applicant has made to that art.

(4) This brings up the disclosure of Lawrence of the use of butyl carbitol. To be sure, as the Examiner has stated, he has mentioned this solvent, but what has he really taught as to its use in a printing ink? Lawrence says it is desirable because it does not evaporate rapidly at 100° C. Applicant uses it because he knows it does evaporate rapidly at 100° C. and higher, especially from the thin film of an applied print. Applicant has not obtained any benefit from Lawrence in this respect, for had he followed Lawrence's teaching he would have been entirely misled. Thus, according to Lawrence, butyl carbitol was not a solvent which would meet applicant's requirements and the very reason Lawrence advances to its desirability is precisely the reason why, were it true, applicant would avoid it.

It is felt that the Examiner is too readily relying for anticipation upon the mere mention in prior patents of the specific ingredients of applicant's ink, without consideration of the purpose and function of these ingredients, the manner in which they have been associated and the results obtained. Lawrence is sufficient only to show that butyl carbitol and a resin have been included in a composition of the transfer

ink type, and this is not what applicant has invented nor what he is claiming.

Although applicant has scrutinized the Davidson article for a disclosure of diethylene glycol butyl ether as a solvent for both resin and nitrocellulose and has been unable to find it, he is ready to concede that this chemical was known to have these solvent properties. But as will be seen hereinafter, neither Davidson nor anyone else knew how to utilize them to make a printing ink like applicant's.

Middleton has a special film-marking composition in which he uses many times more solvent than necessary, required or possible in applicant's ink. The concentration of Middleton's ink is entirely too low. He mentions various solvents including ethylene glycol monoethyl ether which, as has previously been indicated, possess far too high a vapor pressure at room temperatures for use in applicant's product. Middleton uses this solvent because of its highly desirable drying qualities (Middleton page 1 line 96), and it is apparent that this solvent is not substantially non-drying at room temperatures. Middleton does not suggest solvents, like diethylene glycol butyl ether, which have the vapor pressure characteristics desired or claimed.

Fleischmann discloses an intaglio printing color in which he mixes certain peculiar resins with volatile organic solvents. He suggests the incorporation of a little nitrocellulose and other compounds in addition to these resins. But nowhere does he suggest heating the colors to dry them by evaporation, and from the nature of the solvents employed it is apparent that they are all highly volatile and possess such high vapor pressure at room temperatures that he would not need any heat to accelerate evaporation, and it is apparent that should he use heat he would only accentuate the tendency of his colors to dry before the print has been applied. Fleischmann's solvents will have vapor pressures at room temperatures far above that required in the claims. For instance, ethyl alcohol and ethyl acetate have vapor pressures at room temperatures in excess of 60 mm. of mercury, which shows that they are about 1800 times more volatile at room temperatures than the solvents which applicant has specified..

Defendant's Exhibit E.

Applicant is at a loss to know how the various comments of the Examiner in reference to Davidson, Middleton and Fleischmann, sustain or improve the rejection of claims 11-17 inclusive on Lawrence, as Lawrence will still fail to meet the claims even though the various features of the other patents alluded to by the Examiner are superimposed upon it. Thus, the substitution of the nitrocellulose of Davidson's lacquers, or of Fleischmann's intaglio colors, or the shellac or sandarac of Middleton's film-marking composition, or the peculiar resins of Fleischmann's composition, for what might be equivalent substances in Lawrence's thermoplastic composition, would not yield applicant's product as described or claimed, for no reference suggests making a printing ink by dissolving the solids in a solvent of the class specified by applicant in sufficient concentration to give the normal qualities of tack and viscosity of a printing ink, as defined. The result of such substitution will be far different from that which applicant has achieved and that which he has claimed.

Thus, applicant will concede that Lawrence, Davidson, (assuming Davidson disclosed butyl carbitol), Middleton and Fleischmann each mentioned a specific substance, or suggested a solvent for some particular transfer ink, brushing lacquer, moving picture film marking composition, or intaglio color, each of which is either of a different consistancy from that of ordinary printing inks, or possesses different drying characteristics from those of applicant's product. But it is not conceded that the Examiner is justified in applying these independent suggestions to the novel combination described and claimed in the present application, or in doing so, that he has shown anticipation. For the references relate but remotely to the applicant's invention and from none of them is it possible to gain a comprehensive view of applicant's achievement in combining all these separate factors into a new and useful result. It is only in the light of applicant's own disclosure that the Examiner is able to reconstruct the invention by piecing together these prior art patents and publications. This is thought to be improper, unfair and not in accord with the osteblished practice of the Patent Office.

Defendant's Exhibit E.

As to the Examiner's holding that the selection of the substances with which applicant constructed his ink was a matter of choice, it is submitted that this is true of every invention. The important thing is whether the correct choice was made and success achieved. Applicant has made the correct choice and the correct correlation of factors in view of the many requirements of the printing ink art. He has produced a new and useful result which the prior art fails to show has been produced.

Goodyear chose sulfur with which to heat rubber, -- a good choice because he produced vulcanization. Sulfur was old, rubber was old, and heating was old, but vulcanized rubber was new. Baekeland did not discover that a condensation product of formaldehyde and phenol could be obtained, for it was well known that an infusible, insoluble, porous composition, full of water bubbles could be produced with these substances. But Baekeland found that by controlling the conditions of reaction he could delay the solidification of the product, and in the meantime could rid it of its water and mould it into any desired shape. The regulation of these conditions was a matter of choice, even with Baekeland. Everything is a matter of choice but it is the wise and successful choice in producing a new and useful result that the patent statutes were designed to reward. It is submitted that applicant's choice is such.

As to the rejection of the first seven claims as met by Schneider No. 1,966,907; it is pointed out that Schneider has already been fully discussed and distinguished and will not again be discussed. The fundamental trouble with Schneider, so far as anticipation is concerned, is that he uses such low vapor pressure solvents that he can't possibly obtain quick drying by evaporation and must rely on the absorption principle. As to the other references used by the Examiner to support Schneider as an anticipation, it is conceded that dibutyl phthalate has a very low vapor pressure at room temperatures. But neither these

Defendant's Exhibit E.

Re 1,984,961 see Circular 839 page 287 [illegible] to use it in a printing ink along with other materials which have different properties and functions, and in which the properties and functions of the total number of individual ingredients coact and co-operate to give a printing ink which is new and useful in its construction, operation and result, as described and claimed by applicant. Reese's bonding medium is of no assistance as it is not a printing ink and has not a printing ink consistency, but a liquid consistency that precludes its use as such.

As has been previously pointed out, Reese is concerned with the formation of a bonding medium for use in a special process of making ornamental transfers. In this medium, it is true, he calls for the use of a low vapor pressure solvent. But the fact that he mentions butyl carbitol in one of his illustrative compositions is of no anticipatory significance so far as the present invention is concerned, for his bonding material is sprayed on by spraying machine 9 through nozzles 11. The bonding medium of Reese clearly is not a printing ink and does not and cannot possess the qualities of tack and viscosity of a printing ink.

Reese's decorative films, as distinguished from his bonding medium, all contain high vapor pressure solvents, and are all lacquer type films which are prepared from lacquer-like liquids which likewise do not possess the qualities of tack and viscosity -- the heavy consistency -- of a printing ink. The purpose of Reese is to provide a special bonding medium which will cause the superimposed decoration to adhere, and to provide an interrelation between the two films that will allow the low vapor pressure solvents of the bonding medium to exert a solvent action on the coating and thus to provide a means of escape of the volatilized solvents. This may be and probably is an ingenious idea in the art of ornamental transfers, but it is in no sense related to the inventive concepts of the present application.

As to claims 12, 15 and 17, the Examiner is again reminded that the substitution of a cellulose ester in the place of Schneider's

resin will not give applicant's ink as claimed in these claims or in any of the other claims, and such a substitution in the place of Lewrence's ozokerite, Amberol or Cumar will not give the ink of claim 20 or claim 32 or of any of the other claims. The compositions of the patents fail to meet the terms or the substance of the claims and even though their various ingredients are intersubstituted they do not disclose the printing ink claimed. No single reference gives a proper outline of fundamentals which would warrant the substitution of elements from other sources. There is no basic anticipatory reference.

It is respectfully pointed out that the products to which the Examiner refers in the various references are so unlike that of the present invention that the latter is made all the more outstanding and obvious. In each reference, although there is disclosed some one or two of the ingredients which the applicant has found it desirable to use, the patentees use such other and different ingredients or such other and different steps that the result in each is entirely different from that sought and achieved by this applicant. This is true of the patentees' disclosures independently or as modified by the Examiner, and a recognition of this fact should leave no doubt that what applicant has disclosed is not anticipated. It might be well to remember also that none of the patentees was the first to discover the various gums and solvents used by them, yet their different purposes, functions and results were recognized by the issue of separate patents to them.

Claims 21, 22, 23, 26, 27, 29, 30 and 31 are stated by the Examiner to be drawn merely to a constituent of an ink and are rejected on Lawrence 1,954,450, or Schneider. The claims, it is true, are drawn to cover the vehicle of an ink but if such vehicle constitutes new composition of matter there should be no objection to claiming the same. It is felt that claims to the vehicle represent a perfectly proper subcombination under the combination representing the ink. Lawrence does

not meet the claims because (1) he does not have a printing ink and, therefore, has no printing ink vehicle; (2) he does not use material selected from the group comprising cellulose compounds and resins that are solid, coherent and non-sticky at room temperatures, but uses waxy ozokerite or sticky Cumar resin; (3) his marking composition contains lithographic varnishes and dryers and, therefore, relies upon oxidation or polymerization rather than upon evaporation; (4) the solvents are not present in sufficient quantity to cause the vehicle rapidly to vaporize and thereby quickly to dry the vehicle by evaporation on the application of heat; (5) the vehicle contains no solvent which has no appreciable vapor pressure at room temperatures. These features of differentiation apply to the broader claims of the group, the more specific claims, such as claims 25 and 30, being clearly not met by the Lawrence patent which does not remotely suggest a vehicle for printing ink comprising nitrocellulose dissolved in diethylene glycol butyl ether with or without the admixture of dibutyl phthalate.

The claims mentioned in the preceding paragraph are also entirely free from anticipation by the Schneider patent in the following matters:

(1) The resin of Schneider (paracumarone) is a cumerone resin and is not one of the group which are solid, coherent and non-sticky when free of solvent at or above room temperatures.

(2) This resin is not dissolved in solvents having a vapor pressure at elevated temperatures sufficient to cause the same rapidly to vaporize and thereby quickly to dry the vehicle by evaporation.

(3) The solvent of Schneider does not have a vapor pressure at room temperatures of approximately .05 mm. of mercury but has practically no vapor pressure at all at these temperatures.

(4) There being no solvent having the specified vapor pressure at elevated temperature, there is, of course, no basis of anticipation for the requirement that this solvent be present in quantities suf-

ficient to cause the vehicle to dry rapidly by evaporation. It is pointed out also that Schneider, like Lawrence, adds a dryer to his composition, a component which applicant expressly seeks to avoid.

The Reese patent, although containing some illustrative compositions of his bonding medium containing nitrocellulose and butyl carbitol, does not meet claims 21, 22, 23, 26, 27, 29, 30 and 31, because of the following facts:

(1) Reese's bonding medium is not a vehicle for printing ink, as claimed.

(2) His butyl carbitol is not present in quantity sufficient to cause the vehicle rapidly to vaporize and thereby to dry the vehicle by evaporation upon the application of heat, as called for in the claims.

(3) The vehicle, containing as it does volatile solvents like ethyl acetate, butanol and toluol, is not, as required by the claims, sufficiently free from highly volatile solvents as to be substantially non-drying at room temperatures and, as previously emphasized, the Reese product is designed for so different a purpose and gives so different a result that it in fact constitutes a non-analogous art.

It is observed by the Examiner that applicant claims no specific proportions and, so far as the claims are concerned, a composition consisting of 99% resin and 1% solvent would be included and that such a composition would not be useful. It is pointed out that the claims are not broad enough to cover such a wide range as they either call for an ink in which the stated solid materials are dissolved in sufficient concentration to produce the normal qualities of tack and viscosity of a printing ink, - a definite and known standard of consistency which could not be obtained with 99% resin and 1% solvent: or

a vehicle in which the dissolved substances are dissolved in a solvent which is present in sufficient quantity to cause the ink to dry rapidly by evaporation. Moreover, a composition such as supposed by the Examiner would not constitute a printing ink or vehicle therefor, and accordingly would be excluded at the outset from every claim which this applicant has made.

It is unreasonable to suppose that the 22 references cited and referred to by the Examiner during the prosecution of this case, or even the seven references cited in the last action, anticipate the invention of this applicant. If this were true, the references would anticipate each other and most of them should never have been issued. If the Examiner cannot produce a basic reference showing applicant's product or its equivalent, it is submitted that he cannot show anticipation and should allow the claims.

If any one of the patents contained a disclosure of a printing ink in which a resin that was solid, coherent and non-sticky when solvent free, was dissolved in a solvent in sufficient concentration to produce the normal qualities of consistency of a printing ink, and in which the solvent had the vapor pressure characteristics required by the claims, and was present in quantity sufficient to cause the vehicle t dry rapidly by evaporation at elevated temperatures, -- then, it would be conceded, the substitution of nitrocellulose for such a resin would not involve invention. But this is not the case and no reference contains a disclosure sufficient to make it fundamentally anticipatory, and there is no justification for the substitution of equivalents in a disclosure that does not contain all the basic elements of the combination associated together in the manner specified in the claims.

New claims 33 to 41 have been added after a thorough consideration of the whole art cited, in an effort to define the invention more clearly. These claims are all distinguishable from the art in one or more respects, and as the points of distinction have been fully explained, it it unnecessary to take up the claims in detail.

Defendant's Exhibit E.

While it is not the purpose of applicant to burden the Office with too lengthy an amendment and argument, the foregoing rather voluminous material has been necessitated by the Examiner's wholesale combination and association of references in each of the stated grounds of rejection, thus necessitating an analysis of each reference in order to reach proper conclusions as to what each reference does and does not disclose or suggest, and further necessitating a comparison of these disclosures or suggestions with those of applicant, and an application thereof to the claims. It is felt, however, that the argument meets every objection that has been raised and that applicant has successfully carried the heavy burden which has been imposed upon him, -- a burden that derives its weight from the number of references applied rather than from the substance of these references.

Favorable reconsideration is thought to be in order.

Respectfully submitted,

Attorney for Applicant.

Defendant's Exhibit E.

...W. D. ...son 4708
ALBERT L. GESSL...
PRINTING INK AND METHOD
OF MAKING SAME.
Serial No. 621,403.
Filed July 14, 1902.

STATE OF ...)
: ss.:
COUNTY OF NEW YORK.)

FREDERICK O. ZINSSER, being duly sworn, says:

That he is Chairman of Zinsser & Co. Inc., manufacturers of fine chemicals, photographic developers, dyestuffs, and dry colors, at Hastings-on-Hudson, County of Westchester, State of New York; that he has been engaged in the manufacture of chemicals since 1892.

That his educational qualifications as a chemist are as follows: He attended Columbia University School of Mines from 1884 to 1886; that he then studied at the University of Louvain, Belgium, during the years 1887 and 1888, and during that time was assistant to Prof. Blas, Professor of chemistry of Louvain and Board of Health chemist for the Kingdom of Belgium. That he studied at the University of Goettingen in Germany in 1889 and 1890, and while there worked under Dr. Victor Meyer. That in 1890 Dr. Meyer migrated to the University of Heidelberg, Germany, and that deponent went with him to that university and continued his studies under him during the years 1890 and 1891. That deponent received the degree of Doctor of Philosophy in Chemistry from the University of Heidelberg. That thereafter deponent returned to the United States and during the period of 1892 to 1896 was engaged as factory superintendent in the manufacture of varnishes, paints and similar supplies. That in 1897 deponent established the firm of Zinsser & Co. at Hastings-on-Hudson, County of Westchester, State of New York. That since that time and down to date he has been connected with this Company as a manufacturer of fine chemicals, photographic developers, dyestuffs, dry colors and printing inks.

That he has read the patent ... by the ... in

Defendant's Exhibit E.

charge of Gessler application Serial No. 622,453, as follows:

McIlroy No. 1,489,356
McIlroy No. 1,489,357
McElroy No. 1,450,692
McElroy No. 1,471,746
Doughty No. 1,439,695
Doughty No. 1,439,696.

That deponent has carefully studied each of these patents and understands the art to which they relate and the processes and products disclosed therein. That deponent is also familiar with the said Gessler application for patent Serial No. 622,453 for Printing Ink and understands the process and product disclosed therein. That the Gessler invention is for a quick-drying ink adapted to print on paper in ordinary printing processes. It is suitable and, indeed, highly efficient for the printing of books, newspapers and magazines and may be used for the production of half-tones and similar pictorial work. The Doughty and McElroy inventions are wholly unsuited for any of these purposes. All six of the said patents relate to a so-called ink of the same general type, said ink being suitable for stamping leather, book-cloth, and similar materials, with a metal pigment and a binder. The binder is a gum, such as Cumar gum, neutral as to acidity, dissolved in terpineol and rosin oil.

In collaboration with Dr. Alfred Burger, who also makes an affidavit accompanying the present affidavit, deponent carried out detailed experiments to produce the product of the Doughty and McElroy patents. Deponent and Dr. Burger chose the McIlroy patent No. 1,489,357 as a typical example of the group of patents, and for the reason that this patent contains the most specific directions for the production of this special type of ink and because it was, as a consequence, the most suitable as a guide to the actual production of an ink exemplifying the work of these patentees.

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Using the said McIlroy patent No. 1,489,357, therefore, as a guide, deponent and Dr. Burger proceeded as follows: They weighed 156.6 grams of terpineol and to it they added 8.4 grams of rosin oil, stirring

Defendant's Exhibit E.

until thoroughly mixed. These proportions constituted 95% terpineol and 5% rosin oil as called for by the patent.

They then added 32 grams of powdered "Cumar" resin to this mixture, the "Cumar" thus constituting 16% of the whole mixture of 159.6 + 8.4 + 32, or 16% of the 200 gram total, and warmed this mixture upon a water bath at 100° C., stirring meanwhile until the "Cumar" was thoroughly dissolved. After cooling the batch they took 150 grams of it and added to it 300 grams of bronze powder composed of 240 grams of No.1 (80% of the powder mixture) and 60 grams of fine bronze powder known as "lining" (the 60 grams constituting 20% of the powder mixture). The total bronze powder content was thereafter equivalent to 300/450ths or two-thirds of the whole and the vehicle content was 150/450ths or one-third of the whole, as called for by McElroy.

They stirred this mixture until the bronze powder was thoroughly incorporated. The resulting gold color stamping ink is shown in the bottle marked Exhibit A which is submitted with this affidavit and made a part hereof.

The resulting ink is of a liquid, flowable consistency differing markedly in physical characteristics from the standard printing ink used for commercial printing. Submitted herewith and made a part hereof is a one-half pound can of Sinclair & Valentine's Standard Peacock Blue Ink, marked Exhibit B, which exemplifies the normal qualities of tack and viscosity -- the heavy consistency -- of a printing ink for commercial printing equipment. This heavy, tacky consistency is required for commercial printing to enable the ink properly to be spread upon the plates and distributed over the rollers of standard printing machinery and the composition of McElroy is entirely and definitely lacking in the properties of tack, viscosity and consistency to enable it to be so used. The differences in consistency between Exhibit B and Exhibit A are plainly observable to anyone.

Also submitted herewith and made a part hereof are samples

Defendant's Exhibit E.

of red and blue inks marked respectively Exhibits C and D, made in accordance with the aforementioned application of Dr. Gessler. These samples show a marked similarity in tack and viscosity with the standard ink exemplified in Exhibit B and have a similar heavy consistency. Exhibits C and D are, however, totally different from the McElroy ink of Exhibit A. The vehicle of Exhibit A strikes through the paper upon which a print has been made with it and leaves an oily outline which shows an absorption of the vehicle into the paper very much worse than that usually characterized by an ink which "halos". The McElroy ink is unstable and after a few hours the heavy metal pigment settled to the bottom.

The Cumar resin used was the most solid form of this type of resin obtainable in order to enable the patentee's instructions of preparing it in powdered form, to be carried out. Nevertheless, the resin was so sticky at room temperatures that it had to be cooled in a refrigerator to cause it to harden sufficiently to comminute it, and even then it had to be used immediately to prevent its going back to the sticky state. This resin is similar in this respect to dammar resin, Burgundy pitch, Canadian balsam, etc., referred to in the Doughty patents, and none of these gums possess the properties of solidity, coherence and lack of stickiness, that would enable them to be used in a printing ink compounded in accordance with the principles of Dr. Gessler's application. It is a fact that these resins will all fuse at the temperatures required in Dr. Gessler's process and would, therefore, not respond to a treatment designed to produce a hard flexible print merely by the evaporation of the solvent used.

Sworn to before me this)
6th day of December, 1934.) Frederick S. Zimmer

Thomas J. Hunt

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Defendant's Exhibit E.

Div. 64 Room 4708
ALBERT E. GESSLER
PRINTING INK AND METHOD
OF UTILIZING SAME
Serial No. 622,453
Filed July 14, 1932.

JAN 16 35
U.S. PATENT OFF.

STATE OF NEW YORK : SS.:
COUNTY OF WESTCHESTER.)

ALFRED BURGER, being duly sworn, says:-

That he is research chemist in the employ of Zinsser & Co.Inc., manufacturers of fine chemicals, photographic developers, dyestuffs, dry colors, and other similar products, at Hastings-on-Hudson, County of Westchester, State of New York.

That his educational qualifications as a chemist are as follows: That he studied at the Polytechnic Institute of Zurich, Switzerland, during 1901 and 1902. During 1902-1903 he attended the University of Basle; from 1903 to 1905 he studied at the Polytechnic Institute of Charlottenburg, Berlin, Germany. In 1905-1906 he was engaged at Clausthal, Germany, as assistant to Prof. Biltz, and in the years 1906 and 1907 he was engaged at the Sorbonne, Paris, as assistant to Prof. Urbain. That since 1907 down to date, he has been engaged in various establishments in the manufacture of pigments, ink and lacquers, and particularly as a dry color expert, and at the present time, as above stated, he is engaged with Zinsser & Co. Inc. as a dry color expert for printing inks and lacquers at the plant of that Company located at Hastings-on-Hudson, County of Westchester, State of New York.

That he has read the patents suggested by the Examiner in charge of Gessler application Serial No. 622,453, as follows:

McElroy No. 1,489,356
McElroy No. 1,489,357
McElroy No. 1,450,692
McElroy No. 1,471,748
Doughty No. 1,439,695
Doughty No. 1,439,696.

C

Defendant's Exhibit E.

That deponent has carefully studied each of these patents and understands the art to which they relate [illegible] the processes and products disclosed therein. That deponent is also familiar with the said Gessler application for patent Serial No. 622,453 for Printing Ink and understands the process and product disclosed therein. That the Gessler invention is for a quick-drying ink adapted to print on paper in ordinary printing processes. It is suitable and, indeed, highly efficient for the printing of books, newspapers and magazines and may be used for the production of half-tones and similar pictorial work. The Doughty and McElroy inventions are wholly unsuited for any of these purposes. All six of the said patents relate to a so-called ink of the same general type, said ink being suitable for stamping leather, book-cloth, and similar materials, with a metal pigment and a binder. The binder is a gum, such as Cumar gum, neutral as to acidity, dissolved in terpineol and rosin oil.

In collaboration with Dr. Frederick P. Zinsser, who also makes an affidavit accompanying the present affidavit, deponent carried out detailed experiments to produce the product of the Doughty and McElroy patents. Deponent and Dr. Zinsser chose the McElroy patent No.1,489,357 as a typical example of the group of patents, and for the reason that this patent contains the most specific directions for the production of this special type of ink and because it was, as a consequence, the most suitable as a guide to the actual production of an ink exemplifying the work of these patentees.

Using the said McElroy patent No. 1,489,357, therefore, as a guide, deponent and Dr. Zinsser proceeded as follows: They weighed 159.6 grams of terpineol and to it they added 8.4 grams of rosin oil, stirring until thoroughly mixed. These proportions constituted 95% terpineol and 5% rosin oil as called for by the patent.

They then added 32 grams of powdered "Cumar" resin to this mixture, the "Cumar" thus constituting 16% of the whole mixture of

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Defendant's Exhibit E.

150.6 + 96 + 38, or 16% of the [redacted] total, and warmed this mixture upon a water bath at 100° C., stirring meanwhile until the "Cumar" was thoroughly dissolved. After cooling the batch they took 150 grams of it and added to it 300 grams of bronze powder composed of 240 grams of No. 1 (80% of the powder mixture) and 60 grams of fine bronze powder known as "lining" (the 60 grams constituting 20% of the powder mixture). The total bronze powder content was thereafter equivalent to 300/450ths or two-thirds of the whole and the vehicle content was 150/450ths or one-third of the whole, as called for by McElroy.

They stirred this mixture until the bronze powder was thoroughly incorporated. The resulting gold color stamping ink is shown in the bottle marked Exhibit A which is submitted with this affidavit and made a part hereof.

The resulting ink is of a liquid, flowable consistency differing markedly in physical characteristics from the standard printing ink used for commercial printing. Submitted herewith and made a part hereof is a one-half pound can of Sinclair & Valentine's Standard Peacock Blue Ink, marked Exhibit B, which exemplifies the normal qualities of tack and viscosity -- the heavy consistency -- of a printing ink for commercial printing equipment. This heavy, tacky consistency is required for commercial printing to enable the ink properly to be spread upon the plates and distributed over the rollers of standard printing machinery and the composition of McElroy is entirely and definitely lacking in the properties of tack, viscosity and consistency to enable it to be so used. The differences in consistency between Exhibit B and Exhibit A are plainly observable to anyone.

95

Also submitted herewith and made a part hereof are samples of red and blue inks marked respectively Exhibits C and D, made in accordance with the aforementioned application of Dr. Gessler. These samples show a marked similarity in tack and viscosity with the standard ink

Defendant's Exhibit E.

exemplified in Exhibit B and have a similar heavy consistency. Exhibits C and D are, however, totally different from the McElroy ink of Exhibit A. The vehicle of Exhibit A strikes through the paper upon which a print has been made with it and leaves an oily outline which shows an absorption of the vehicle into the paper very much worse than that usually characterized by an ink which "halos". The McElroy ink is unstable and after a few hours the heavy metal pigment settled to the bottom.

The Cumar resin used was the most solid form of this type of resin obtainable in order to enable the patentee's instructions of preparing it in powdered form to be carried out. Nevertheless, the resin was so sticky at room temperatures that it had to be cooled in a refrigerator to cause it to harden sufficiently to comminute it, and even then it had to be used immediately to prevent its going back to the sticky state. This resin is similar in this respect to damar resin, Burgundy pitch, Canadian balsam, etc., referred to in the Doughty patents, and none of these gums possess the properties of solidity, coherence and lack of stickiness, that would enable them to be used in a printing ink compounded in accordance with the principles of Dr. Gessler's application. It is a fact that these resins will all fuse at the temperatures required in Dr. Gessler's process and would, therefore, not respond to a treatment designed to produce a hard flexible print merely by the evaporation of the solvent used.

Sworn to before me this)
12th day of December, 1934.) Alfred Benzon

P. F. Mealy

NOTARY PUBLIC

Defendant's Exhibit E.

RECEIVED
JAN 16 1935
PATENT OFFICE

64

CHARLES J. HOLLAND
ATTORNEY AND COUNSELLOR AT LAW
GRAYBAR BUILDING
EASTERN CONCOURSE · GRAND CENTRAL TERMINAL
NEW YORK CITY

TELEPHONE MOHAWK 4-5078-5079

January 14, 1935.

Hon. Commissioner of Patents,
Washington, D. C.

Forwarded Room

S i r : -

Re Gessler Serial No. 622,455 -- The attached exhibits are referred to in the affidavits of Dr. F. G. Zinsser and Dr. Alfred Berger which accompany the amendment in the above entitled case filed on even date herewith, and constitute a part thereof.

Respectfully,

Charles J. Holland

CJH:M

Attorney for Applicant.

Defendant's Exhibit E.

Bally 4708

Paper No. 13

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

SC/he

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Charles J. Holland,
420 Lexington Ave.,
New York, N. Y.

Applicant: Albert E. Gesslan

Ser. No. 622,453
Filed July 14, 1932
For Printing ink and method of utilizing same

APR 10 1935

In response to amendment filed Jan. 16, 1935.

Claims 11 to 23 inclusive, 26, 27, 29, 30, 31 and 32 are again rejected for the reasons and references as stated in the last Office action.

In claims 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 26, 27, 29, 31 and 32, the amendment of "that are solid, coherent and non-sticky when solvent free" has been made thereto. The resins and nitrocellulose of the references are thought to also have these characteristics. This amendment was not in the application as filed but was added to page 4, line 5, of the specification and hence these qualities are thought to be obvious or else this amendment would apparently be based upon matter not originally disclosed.

Claim 20, line 4, the term "heavy consistency" added by amendment is not thought to render the claim patentable as the references obviously have a base material such as resin or nitrocellulose of such consistency so as to be suitable for ink. Moreover the term is comparative and not specific.

Claim 22, line 4, the amendment "quantity sufficient" relates to a functional or use difference and is not thought to be a patentable distinction and obviously the references use desired amounts of solvents so as to produce suitable ink.

Claims 26, 27, 29 and 32 have been similarly amended but as stated this amendment is not thought to render the claims patentable.

Claim 32 has been rejected as unpatentable over Doughty

1,439,696 of record. Applicant argues that the resins used by Doughty would become sticky although Doughty on page 1, lines 49 to 51 states that his vehicle which contains the resin does not become gummy and has a suitable consistency for the printing process. In claim 32 no specific resin is claimed but on page 4, lines 4 and 5 of the specification applicant states that he uses either natural resin or synthetic resin, and Doughty also uses both natural resins and synthetic resins, page 1, lines 90 to 101. Accordingly claim 32 is not thought to be patentable over Doughty. Applicant has submitted affidavits by F. G. Zinsser and A. Burger and samples stated as made in accordance with McElroy patent 1,489,357, which is stated to have the same assignee as the Doughty patent.

Exhibits of other printing inks including applicant's are also submitted.

The affidavits state that the ink of Doughty is not suitable for the printing books and ordinary commercial printing.

However the ink of Doughty is a printing ink.

Claim 32 is drawn to a printing ink, a composition of matter, and not to a process of printing. There are many different kinds of printing processes.

Thus applicant is relying upon a functional or use difference over Doughty which is not thought to be a patentable difference sofar as the ink composition is concerned. Accordingly the affidavits and exhibits are not thought to render claim 32 patentable over Doughty.

Applicant has argued that Schneider uses a solvent which has practically no vapor pressure at all at room temperature. Applicant uses dibutyl phthalate disclosed by Schneider and diethylene glycol butyl ether or butyl carbitol. Schneider discloses diamyl phthalate which has a very low vapor pressure as stated in the last office action, and which is considered to be the equivalent of butyl carbitol used by applicant.

Defendant's Exhibit E.

In claim [illegible] claiming a solvent having very low vapor pressure. In claim 29, applicant is claiming a solvent which has no appreciable vapor pressure at room temperature. Schneider is accordingly thought to be a proper reference.

Incidentally butyl ether of diethylene glycol known commercially as butyl carbitol is stated as the last example on page 671 in the Davidson article of record.

Claims 33, 34, 35, 36, 39 and 41 which are similar to claim 32 are similarly rejected as unpatentable over either 1,954,450 of record, or Schneider or Doughty. It is to be noted that Doughty has quick drying when heated, page 2, lines 60 and 61.

Claims 37 and 38 which are similar to claim 18 are similarly rejected as unpatentable over either 1,954,450 or Schneider who have similar low vapor pressure solvents.

As an issue has clearly been reached, and no new references have been cited, the rejection of all the claims is made final. Ex Parte Miller 139 O. G. 730, Ex Parte Perry 140 O. G. 1001, Ex Parte Coddington 96 O. G. 1239, and Ex Parte Jackson 353 O. G. 5.

P. M. Nash
Examiner.

[illegible] 53 96.

Defendant's Exhibit E.

MAY 14 1935

Application of Albert E. [redacted],
For Improvements in Printing Ink and Method of
Utilizing Same,
Filed July 14, 1933,
Serial No. 622,453.

MAY 14 1935 U.S. PATENT OFFICE

The Commissioner of Patents,

Washington, D. C.

Sir:

The International Printing Ink Corporation, an Ohio corporation, having an office and place of business at 75 Varick Street, New York City, New York, assignee of the entire right in the above-entitled application, by virtue of an assignment executed April 2, 1935, and received by the Patent Office on May 6, 1935, hereby revokes all previous powers of attorney given herein, and hereby appoints Robert W. Byerly, of 225 Broadway, in the County of New York, and State of New York, whose registration number is 3194, its attorney, with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent Office connected therewith.

Signed in New York City, New York, this 13th day of May, 1935.

THE INTERNATIONAL PRINTING INK CORPORATION

By [signature]

Vice-President

Accepted.

MAY 16 1935

622453

Defendant's Exhibit E.

EEC

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

May 16, 1935.

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Applicant Albert E. Gessler

Serial No. 622,453

Filed July 14, 1932

For Printing Ink and Method of Utilizing Same

Div. 64

In this case your power of attorney has been accepted.

Respectfully,

Commissioner

, assignee

Revoking power of attorney

to

Charles J. Holland,
420 Lexington Ave.,
New York, N. Y.

Defendant's Exhibit E.

MAY 29 1935

Div. 44 Room 4708
ALBERT E. GESSLER
PRINTING INK & METHOD
OF UTILIZING SAME
Serial No. 682,486
Filed July 14, 1933.

New York, May 27 1935.

HON. COMMISSIONER OF PATENTS,
Washington, D. C.

S i r : -

Please recognize Charles J. Holland, Esq., of No. 420 Lexington Avenue in the Borough of Manhattan, City, County and State of New York, Register No. 11545, as my associate attorney in the above entitled application, with power to participate in the preparation and conduct of the prosecution of the case and to have access to the file.

Please continue to address all communications from the Patent Office to the principal attorney, the undersigned.

Respectfully,

Robert W. Wyeth
Principal Attorney.

AUTHORIZATION.

The International Printing Ink Corporation, assignee of the entire right, title and interest in the above entitled application, herewith authorizes the appointment of Charles J. Holland, Esq., as associate attorney.

THE INTERNATIONAL PRINTING INK CORPORATION.
By Oscar R. Cushman
President.

Defendant's Exhibit E.

4.17
Letter

Application of Albert E. Gessler,
For Improvements in Printing Ink and Method of
Utilizing Same,
Filed July 14, 1932,
Serial No. 622,453.

U. S. PATENT OFFICE
RECEIVED
JUL 9 1935
DIVISION 61

The Commissioner of Patents,
Washington, D. C.

Sir:

Please note that correspondence concerning this application should be addressed to me, as the associate power to Mr. Holland, filed May 29, 1935, expressly directed that the correspondence be conducted with the principal attorney.

I am calling attention to this matter because I am informed that a recent Office Action in application, Serial No. 15,944, in which a similar power of attorney was filed, has been mailed to Mr. Holland instead of to me.

Very respectfully,

Robert W. Byerly
Principal Attorney

New York City, July 6, 1935.

Defendant's Exhibit E.

U.S. PATENT OFFICE
SEP 26 1935

Application of Albert E. Gessler,
Printing Ink and Method of Utilizing Same,
Filed July 14, 1932,
Serial No. 622,485.

Div. 64

U. S. PATENT OFFICE
RECEIVED
SEP 29 1935
DIV. OF 64

The Commissioner of Patents,

Washington, D. C.

Sir:-

In response to the Office Action of April 10, 1935 and in view of the permission tentatively granted by the Principal Examiner at the interview held today, applicant submits an amendment to place this application in condition for allowance and requests that this amendment be entered provided that the Examiner is satisfied that all the claims presented in it are allowable.

Applicant hereby amends as follows:

Specification, page 3, line 4, before "vapor pressure" insert "low" -- lines 4 and 5, cancel "of the order of about one millimeter or less of mercury" -- line 8, after "raised" cancel matter inserted by amendment filed March 13, 1934 -- between lines 16 and 17, cancel paragraph inserted by amendment filed June 15, 1933 -- line 23, after "alone." cancel matter inserted by amendment filed June 15, 1933 -- lines 10, 27 and 31, change "butylether" to "monobutyl ether".

Specification, page 4, line 7, after "product" cancel matter inserted by amendment filed June 15, 1933.

Specification, page 4, lines 8 to 13, cancel "The diethylene glycol * * * at raised temperatures" -- after line 16, insert the following paragraph:

"The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low

rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures. These important properties of diethylene glycol monobutyl ether, the preponderant solvent in the example given, may be indicated numerically in terms of its vapor pressure at different temperatures which are as follows:

At 20°C.	0.055	mm.
At 100°C.	8.0	mm.
At 150°C.	55.0	mm.

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at room temperature. The vapor pressures of my preponderant solvent at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid is 0.026 mm. at 100°C. and 0.7 mm. at 150°C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100°C. or 150°C."

Cancel the claims and insert the following claims:

42. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose esters - dissolved in the liquid component in sufficient quantity to give the proper consistency for typographic printing, in which the major part of the liquid component is an organic solvent for both cellulose esters and resins having a vapor pressure which at 20° C. is less than 0.06 mm. of mercury and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

43. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose esters - dissolved in the liquid component in sufficient quantity to give the proper consistency for typographic printing, in which substantially 73% of the liquid component is an organic solvent for both cellulose esters and resins having a vapor pressure which at 20° C. is less than 0.06 mm. of mercury and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

44. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins

and cellulose esters - dissolved in the liquid component in sufficient quantity to give the proper consistency for typographic printing, in which substantially all the liquid component has a vapor pressure of less than 0.06 mm. of mercury at 20° C. and the major part of the liquid component has a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

45. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose esters - dissolved in the liquid component in sufficient quantity to give the proper consistency for typographic printing, in which the major part of the liquid component is an ether including one butyl radical and one diethylene glycol radical and having a vapor pressure which at 20° C. is below 0.06 mm. of mercury and at 150° C. approximates that of ethyl alcohol.

46. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose esters - dissolved in the liquid component in sufficient quantity to give the proper consistency for typographic printing, in which the major part of the liquid component is monobutyl ether of diethylene glycol.

47. A printing ink which is substantially non-drying at ordinary temperatures and which dries rapidly at 150°C. consisting of a coloring matter dispersed in a viscous fluid vehicle consisting of a liquid component the major portion of which is an organic solvent for both nitrocellulose and resin having a vapor pressure which at 20°C. is below 0.06 mm. and at 150°C. approximates that of ethyl alcohol, and a solid component dissolved in the liquid component in an amount at least ~~three~~ 45% of the amount of said vehicle, said solid component being a member of the group consisting of natural and synthetic resins and low viscosity cellulose esters.

REMARKS.

The value of applicant's ink lies in the fact that it does not dry on the press and may be instantly dried by heat on the printed sheet.

The claims now presented make express reference to the result or function of applicant's ink, and are directed to the physical characteristic of applicant's ink which give the ink its valuable new function and distinguish it from the references.

To make the language of the claims clear, explanatory matter has been inserted on p. 4 of the specification, by amendment. This matter consists merely of specific data as to the vapor pressures of ingredients mentioned in the illustrative example. These are inherent characteristics of these ingredients which any properly equipped chemist can determine. The insertion, therefore, does not constitute new matter.

The specific example and data in regard to the ingredients obtainable by a skilled chemist are as follows:

		As % of total liquid	V.P. 20°C.	V.P. 100°C.	V.P. 150°C.
Vehicle					
Diethylene glycol monobutyl ether	55	73)	0.055	8.0	55.
Dibutyl phthalate	10	13)	.001	0.027	0.7
Blown Castor Oil	10	13).	non-volatile		
Total liquid component	75	100			
Solid component (low viscosity nitrocellulose)	35	47			
Pigment	100				

The following physical characteristics of applicant's ink appear from this data:

First. The ink contains a solvent for both nitrocellulose and resins which has a vapor pressure of 0.055 mm. at 20°C., so that its evaporation at room temperature is negligible, and a vapor pressure of 55 mm. at 150°C., so that at this temperature it has the characteristics of a highly volatile liquid such, for example, as ethyl alcohol, whose vapor pressure at ordinary temperature is about 40 mm. To accomplish the results obtained by applicant's ink, no solvent can be equivalent to this solvent, if it has a vapor pressure substantially higher than 0.055 mm. at 20°C., for in this case the ink would dry on the press, or if it has a comparatively low vapor pressure at 150°C., as in this case it could not be vaporized instantly by any heat which can safely be applied to printing matter.

The vapor pressure characteristics of the solvent exemplified by diethylene glycol monobutyl ether (butyl carbitol) in the specific example are defined in the claims now presented by the limitation that the vapor pressure at 20°C. is below 0.06 mm. and at 150°C. approximates that of ethyl alcohol at ordinary temperatures (Claims 44, 45).

Second. The solvent having these vapor pressure characteristics is the major part of the liquid in the vehicle of applicant's ink, amounting to well over 50% of the entire liquid content of the ink. To accomplish applicant's purpose, it is evidently not necessary that the solvent having these characteristics be the only solvent in the ink vehicle, as applicant uses minor percentages of plasticizers, at least one of which, dibutyl phthalate, may be referred to as a solvent. This solvent plasticizer, however, has a vapor pressure of only 0.7 mm. at 150°C., and therefore does not evaporate rapidly when the printed matter is heated. As pointed out in the specification, it remains in the dried ink. But while other solvents not having the vapor pressure characteristics of butyl carbitol may be present in the ink vehicle, it is apparent that to obtain the two results of not drying on the press and drying instantly on heating the printed matter, the solvent having these vapor pressure characteristics must be the major part of the liquid component.

This characteristic of applicant's ink is defined in all the claims now presented by the limitation that the solvent having the specified vapor pressure characteristics constitutes the major part of the liquid component of the ink.

The claims now submitted specify a printing ink consisting of a pigment dispersed in a vehicle which consists of two components, a liquid component and a solid component (nitrocellulose or resin) dissolved in the liquid component. The claims also specify that there must be at least enough of the solid component to give the ink enough consistency for typographic printing. This defines the known type of ink in which applicant's invention has effected an important improvement. This

improvement which gives the ink the valuable characteristics specified in the preamble of each claim is defined in detail in the last clause of each claim. Claim 47 is drawn to specify the solid content characteristic as disclosed by the specific example given in the specification.

In the arguments accompanying the previous amendments, it has been pointed out that none of the references relied on by the Examiner defines the important functional advantages of applicant's ink. The present statement will be limited to pointing out that the physical characteristics of applicant's ink, defined in the claims now presented, distinguish it from the references relied on.

Schneider Patent No. 1,966,907, covering a special ink for imitation engraving which dries very slowly, if at all, contains only solvents of the plasticizer class, all of which have vapor pressures of not more than one mm. at 150°C.

Middleton Patent No. 1,833,086, for a special ink for printing on films, and Fleischman Patent No. 1,787,239, for an ink for intaglio printing, are both unusable in ordinary typographic printing since they contain only highly volatile solvents, the least volatile of which has a vapor pressure above 2 mm. at 20°C.

British Patent No. 335,074, for a lithographic ink, uses for solvents, phthalates, triphenyl phosphate, diethylene glycol mono-salicylate, and tri-acetin, all of which have vapor pressures of not more than 8 mm. at 150°C. and also two volatile solvents, ethyl benzoate and benzyl acetate, both of which have vapor pressures above 0.1 mm. or about twice that of applicant's preferred solvent at 20°C.

Lawrence Patent No. 1,954,450, for a solid transfer ink, mentions applicant's solvent, butyl carbitol and a number of others, one of which, diethylene glycol and possibly others,

have vapor pressure characteristics similar to those of butyl carbitol. But Lawrence does not suggest the use of butyl carbitol or any of these other solvents as the major part of the liquid component of an ink. In his Example No. 2 where butyl carbitol is mentioned, it amounts to only 14% of the liquid component of the ink vehicle. His ink vehicle is clearly a solid, not a viscous fluid.

Reese Patent No. 1,984,961 relates to lacquers rather than printing inks. It mentions butyl carbitol and possibly one or two other solvents having similar vapor pressure characteristics, but in no one of its numerous examples does butyl carbitol or any similar solvent exceed 18% of the liquid component of the composition.

Doughty Patent No. 1,439,696 is for a stamping ink. The patentee contemplated drying his ink by heat, but the method of drying which he proposed is, however, necessarily inoperative in ordinary printing because it contemplated applying no more heat to the ink on the printed matter than to the ink on the type or stamp, as the heat was applied by the stamp. The method, therefore, results in drying the ink on the type in the press, which is precisely what applicant avoids.

Inks of the formulae given in this patent are inoperative when applied by an ordinary typographic press and then heated on the printed matter. They dry on the press and are smudgy after being dried on the paper. The two solvents preferred by Doughty are terpineol and benzyl alcohol which have vapor pressures over 0.1 mm. at 20°C; that is to say, about twice as great as the vapor pressure as applicant's preferred solvent at this temperature. This difference makes them dry too rapidly on the press. Furthermore the Doughty inks are not of the class speci-

fied in the claims as they do not contain sufficient dissolved solid to give sufficient consistency for typographic printing.

All the claims now presented distinguish from Doughty (as well as the other references) by the specific limitations as to vapor pressure characteristics of the major part of the liquid component.

The broadest of the claims now presented No. 42 is substantially in the form worked out at the recent interview as properly defining the true scope of applicant's invention. The other claims define the invention more narrowly. It is requested that this amendment be entered and the application be passed to allowance in order that an appeal may be unnecessary.

It is understood that the above amendment will not be entered unless the Examiner is satisfied that it places the application in condition for allowance. If the Examiner is not so satisfied it is requested that the above claims 42 to 47 be added to the claims now on file and that the above amendments to the specification be entered to clarify the case for the purpose of appeal.

Respectfully submitted,

Robert E. Upshaw

and by R. W. Byerly Jr.
His Attorney.

Defendant's Exhibit E.

Mail 64 Room 4708 DEPARTMENT OF COMMERCE Paper No. 19
Address only ... UNITED STATES PATENT OFFICE ...
WASHINGTON
MC/he

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Applicant: Albert E. Cessler
Ser. No. 622,453
Filed July 14, 1932
For Printing ink and method of utilizing same

MAILED
OCT 3 - 1935

In response to letter and amendment filed July 8 and Sept. 26, 1935.

Additional reference cited:

Clewell 1,806,965 May 26, 1931 134-38

The proposed amendment received Sept. 26, 1935 has not been entered as it does not place the case in condition for allowance.

In the proposed claims ".06 mm." is not found in the description and hence is not a critical vapour pressure. Apparently it should be changed to ".055" which has a basis therefor. Proposed claim 42, line 8, "major part" apparently should be so stated positively in the description.

Proposed claim 47, line 9, "at least 45%" is not found in the description as a critical percentage which should be done although the actual percentage in view of the specific example appears to be nearer 47% than 45%.

Proposed claims 42, 43, 44 and 47 would be rejected as unpatentable over Clewell in case this proposed amendment would be entered. Clewell claims the use of diethylene glycol which is used in major proportion together with shellac, a resin. Applicant has stated on pages 8 and 9 of the proposed amendment that diethylene glycol has vapor pressure characteristics similar to that of butyl carbitol.

Defendant's Exhibit E.

622,453

In proposed claims 45 and 46, "typographic" is apparently new matter not found in the original specification and should be erased or some term found in the original specification substituted therefor.

If this is done, proposed claims 45 and 46 would be allowable as now advised. The proposed amendment will be entered for purposes of appeal if desired. However, a supplemental amendment should be filed including the above suggested corrections. Applicant discloses only butyl carbitol, and note in re Gibbons et al 1934 C. D. 382. The case should be placed in condition for allowance or else an appeal filed within six months from the date of the final rejection.

Apr. 10, 1935.

J M Nash

Examiner.

Defendant's Exhibit E.

20
Gl

Application of Albert E. Gessler,
Printing Ink and Method of
Utilizing Same,
Filed July 14, 1933,
Serial No. 680,453.

Div. 64
Room 4708

The Commissioner of Patents,

Washington, D. C.

Sir:-

In response to the Office Letter of October 3, 1935 refusing to enter the amendment filed September 26, 1935, and citing an additional reference, applicant hereby cancels said amendment filed September 26, 1935 and submits a revised amendment to place this application in better condition for appeal, and requests that this amendment be entered for that purpose.

Applicant hereby amends as follows:

Specification, page 1, line 9, after "Such oils or varnishes" insert "have viscosities of 5 poises or above (Bingham Fluidity and Plasticity Edition 1922, page 5) and"

Specification, page 3, line 4, before "vapor pressure" insert "low" -- lines 4 and 5, cancel "of the order of about one millimeter or less of mercury" -- line 8, after "raised" cancel matter inserted by amendment filed March 13, 1934 -- between lines 16 and 17, cancel paragraph inserted by amendment filed June 15, 1933 -- line 23, after "alone." cancel matter inserted by amendment filed June 15, 1933 -- lines 10, 27 and 31, change "butylether" to "monobutyl ether".

Specification, page 4, line 7, after "product" cancel matter inserted by amendment filed June 15, 1933.

Specification, page 4, lines 8 to 13, cancel "The diethylene glycol * * * at raised temperatures" -- after line 16, insert the following paragraph:

"The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures.

These important properties of diethylene glycol monobutyl ether, the preponderant solvent constituting the major part of the liquid component of the ink in the example given, may be indicated numerically in terms of its vapor pressure at different temperatures which are as follows:

At 80°C.	Between 0.05 and 0.06 mm.
At 100°C.	8.0 mm.
At 150°C.	55.0 mm.

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at ordinary room temperature. The vapor pressures of my preponderant solvent at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid is 0.03 mm. at 100°C. and 0.7 mm. at 150°C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100°C. or 150°C."

Add the following claims:

"~~4.~~ A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a

member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which at 20°C., is ~~less than 0.01 mm. of mercury~~ as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C., and, at 150°C., approximates that of ethyl alcohol at ordinary temperatures.

2. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and substantially 75% of the liquid component being a chemical compound containing carbon, hydrogen and oxygen, which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20°C., is ~~less than 0.01 mm. of mercury~~ as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C., and, at 150°C., approximates that of ethyl alcohol at ordinary temperatures.

3. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, the solid component being a member of the group consisting of natural and synthetic

resins and cellulose compounds, substantially all of the liquid component having a vapor pressure ~~of less than 0.06 mm. of mercury~~ as low as that of diethylene glycol monobutyl ether at 20°C., at 20°C., and the major part of the liquid component having a vapor pressure which at 150°C. approximates that of ethyl alcohol at ordinary temperatures, and forming a stable solution with the ~~liquid~~ solid component.

~~43.~~ A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150°C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose compounds - dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is an ether including one butyl radical and one diethylene glycol radical and having a vapor pressure which at 20°C. is ~~below 0.06 mm. of mercury~~ as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C., and at 150°C. approximates that of ethyl alcohol.

~~44.~~ A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150°C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component - being a member of the group consisting of natural and synthetic resins and cellulose compounds - dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is monobutyl ether of diethylene glycol.

~~45.~~ A printing ink which is substantially non-drying at ordinary temperatures and which dries rapidly at

Defendant's Exhibit E.

150° C. consisting of a coloring matter dispersed in a viscous fluid vehicle consisting of a liquid component the major portion of which is an organic solvent forming stable solutions with both nitrocellulose and resin having a vapor pressure which at 20°C. is ~~below 0.06 mm.~~ as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C. and at 150°C. approximates that of ethyl alcohol, and a solid component completely dissolved in the liquid component in an amount at least 47% of the amount of said liquid component, said solid component being a member of the group consisting of natural and synthetic resins and low viscosity cellulose esters.

~~16~~ A printing ink which is substantially non-drying at ordinary temperatures and which dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in a liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a cellulose compound, and the major part of the liquid component being a chemical compound which dissolves and forms a stable solution with the solid component and which has a vapor pressure which at 20°C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C. ~~less than 0.06 mm. of mercury~~ and at 150°C. approximates that of ethyl alcohol at ordinary temperatures.

REMARKS

The value of applicant's ink lies in the fact that it does not dry on the press and may be instantly dried by heat on the printed sheet.

The claims now presented make express reference to the result or function of applicant's ink, and are directed to the physical characteristics of applicant's ink which give the

Defendant's Exhibit E.

ink its valuable new function and distinguish it from the references. To make the language of the claims clear, explanatory matter has been inserted on p. 4 of the specification, by amendment. This matter consists merely of specific data as to the vapor pressures of ingredients mentioned in the illustrative example. These are inherent characteristics of these ingredients which any properly equipped chemist can determine. The insertion, therefore, does not constitute new matter.

The specific example and data in regard to the ingredients obtainable by a skilled chemist are as follows:

		As % of total liquid	V.P. 20°C.	V.P. 100°C.	V.P. 150°C.
Vehicle					
Diethylene glycol monobutyl ether	55	73)	0.05-0.06	8.0	55.
Dibutyl phthalate	10	13)	.001	0.03	0.7
Blown Castor Oil	10	13)	non-volatile		
Total liquid component	75	100			
Solid component (low viscosity nitrocellulose)	35	47			
Pigment	100				

The following physical characteristics of applicant's ink appear from this data:

First: The ink contains an organic solvent (a chemical compound containing carbon, hydrogen, and oxygen) which has a vapor pressure of between 0.05 and 0.06 mm. at 20°C., so that its evaporation at room temperature is negligible, and a vapor pressure of 55 mm. at 150°C., so that at this temperature it has the characteristics of a highly volatile liquid such, for example, as ethyl alcohol, whose vapor pressure at ordinary temperature is about 40 mm. To accomplish the results obtained by applicant's ink, no solvent can be equivalent to this solvent, if it has a vapor pressure substantially higher

than 0.06 mm. at 20°C., for in this case the ink would dry on the press, or if it has a comparatively low vapor pressure at 150°C., as in this case it could not be vaporized instantly by any heat which can safely be applied to printing matter.

The vapor pressure characteristics of the solvent exemplified by diethylene glycol monobutyl ether (butyl carbitol) in the specific example are defined in the claims now presented by the limitation that the vapor pressure at 20°C. is below 0.06 mm. and at 150°C. approximates that of ethyl alcohol at ordinary temperatures.

Second. The organic solvent dissolves and forms a stable solution with the solid component of the ink vehicle. This is important because it avoids any depositing of the solid component while the ink is on the press and thus enables the dissolved solid component to act effectively as a thickener to give and maintain the proper consistency and also to act as a binder for the pigment after the solvent has evaporated.

This important characteristic of the solvent exemplified by butyl carbitol in the specific example is defined in the claims now presented by specifying a chemical compound which forms a stable solution with the solid component of the vehicle.

Third. The solvent having these characteristics is the major part of the liquid in the vehicle of applicant's ink, amounting to well over 50% of the entire liquid content of the ink. To accomplish applicant's purpose, it is evidently not necessary that the solvent having these characteristics be the only solvent in the ink vehicle, as applicant uses minor

Defendant's Exhibit E.

percentages of plasticizers, at least one of which, dibutyl phthalate, may be referred to as a solvent. This solvent plasticizer, however, has a vapor pressure of only 0.7 mm. at 150°C., and therefore does not evaporate rapidly when the printed matter is heated. As pointed out in the specification, it remains in the dried ink. But while other solvents not having the vapor pressure characteristics of butyl carbitol may be present in the ink vehicle, it is apparent that, to obtain the two results of not drying on the press and drying instantly on heating theprinted matter, the solvent having these vapor pressure characteristics must be the major part of the liquid component.

This characteristic of applicant's ink is defined in all the claims now presented by the limitation that the solvent having the specified characteristics constitutes the major part of the liquid component of the ink.

The claims now submitted specify a printing ink consisting of a coloring matter dispersed in a vehicle which consists of two components, a liquid component and a solid component (nitrocellulose or resin) dissolved in the liquid component. The claims also specify that there must be at least enough of the solid component to give the ink the consistency of an ordinary oil-varnish ink. This defines the known type of ink in which applicant's invention has effected an important improvement. This improvement which gives the ink the valuable characteristics specified in the preamble of each claim is defined in detail in the last clause of each claim. Claim 47 is drawn to specify the solid content proportion as disclosed by the specific example given in the specification. Claim 48 limits the solid component to cellulose esters.

Defendant's Exhibit E.

In the arguments accompanying the previous amendments, it has been pointed out that none of the references relied on by the Examiner defines the important functional advantages of applicant's ink. The present statement will be limited to pointing out that the physical characteristics of applicant's ink, defined in the claims now presented, distinguish it from the references relied on.

Schneider Patent No. 1,966,907, covering a special ink for imitation engraving which dries very slowly, if at all, contains only solvents of the plasticizer class, all of which have vapor pressures of not more than one mm. at 150°C.

Middleton Patent No. 1,833,086, for a special ink for printing on films, and Fleischman Patent No. 1,787,239, for an ink for intaglio printing, are both unusable in ordinary typographic printing since they contain only highly volatile solvents, the least volatile of which has a vapor pressure above 2 mm. at 20°C.

British Patent No. 335,074, for a lithographic ink, uses for solvents, phthalates, triphenyl phosphate, diethylene glycol mono-salicylate, and tri-acetin, all of which have vapor pressures of not more than 8 mm. at 150°C. and also two volatile solvents, ethyl benzoate and benzyl acetate, both of which have vapor pressures above 0.1 mm. or about twice that of applicant's preferred solvent at 20°C.

Lawrence Patent No. 1,954,450, for a solid transfer ink, mentions applicant's solvent, butyl carbitol, and a number of others, one of which, diethylene glycol and possibly others, have vapor pressure characteristics similar to those of butyl carbitol. But Lawrence does not suggest the use of butyl carbitol or any of these other solvents as the major

part of the liquid component of an ink. In his Example No. 2 where butyl carbitol is mentioned, it amounts to only 14% of the liquid component of the ink vehicle. His ink vehicle is clearly a solid, not a viscous fluid.

Reese Patent No. 1,924,961 relates to lacquers rather than printing inks. It mentions butyl carbitol and possibly one or two other solvents having similar vapor pressure characteristics, but in no one of its numerous examples does butyl carbitol or any similar solvent exceed 18% of the liquid component of the composition.

Doughty Patent No. 1,439,896 is for a stamping ink. The patentee contemplated drying his ink by heat, but the method of drying which he proposed is, however, necessarily inoperative in ordinary printing because it contemplated applying no more heat to the ink on the printed matter than to the ink on the type or stamp, as the heat was applied by the stamp. The method, therefore, results in drying the ink on the type in the press, which is precisely what applicant avoids.

Inks of the formulae given in this patent are inoperative when applied by an ordinary typographic press and then heated on the printed matter. They dry on the press and are smudgy after being dried on the paper. The two solvents preferred by Doughty are terpineol and benzyl alcohol which have vapor pressures over 0.1 mm. at 20°C; that is to say, about twice as great as the vapor pressure as applicant's preferred solvent at this temperature. This difference makes them dry too rapidly on the press. Furthermore, the Doughty inks are not of the class specified in the claims as they do not contain sufficient dissolved solid to give the consistency of an ordinary oil-varnish ink such as is used for typographic printing.

Defendant's Exhibit E.

All the claims now presented distinguish from Doughty (as well as the other references) by the specific limitations as to vapor pressure characteristics of the major part of the liquid component.

Clewell Patent No. 1,806,965 describes a special ink for printing on cellulose ester plastics such as moving-picture films. The ink contains a solvent for the material printed upon so that the ink "will be at least partially absorbed into the ester body" on which it is printed (lines 23, 24). The ink was not intended for rapid printing on ordinary paper and the patent contains no suggestion of using heating for instant drying of the ink. The wide boiling point range given in the patent includes many solvents whose vapor pressures would preclude their use for this purpose. The patent, therefore, in no way suggests applicant's invention.

No one of the three examples given in the patent discloses an ink capable of the functions of applicant's ink or meets the claims now presented:

The first two solvents suggested, diacetone alcohol and ethyl lactate have vapor pressures of 8.5 mm. and 8.3 mm. respectively at 20°C. and are thus far outside the vapor pressure range specified in the claims.

Clewell's third example, covered by his Claim 4, to which the Examiner especially refers, is an ink having a vehicle whose solid component is shellac and whose liquid component is diethylene glycol. This ink vehicle is a suspension - not a solution - as shellac (the thickener used by Clewell) is <u>insoluble</u> in diethylene glycol (Durrans, Solvents/ 3rd. Ed. 1933 D. Van Nostrand Co. p..136; Industrial and Engineering Chemistry, July 1926,

Vol. 18, No. 6, p. 671). Furthermore, diethylene glycol cannot form a stable solution, even with thickeners that are soluble in it, since it is so very hygroscopic (Durrans; Solvents/3rd. Ed./pp. 130, 136) that it absorbs water and soon throws out any thickener which has been dissolved in it.

All the claims now presented clearly distinguish from Clewell's first two examples by the vapor pressure range specified, and from Clewell's third example by requiring a solvent which dissolves and forms a stable solution with the solid component of the vehicle.

The informalities in the claims presented by the amendment filed September 26, 1935 have been corrected:

The proposed amendment to the specification has been changed to describe the vapor pressure of butyl carbitol at 20° C. as "between 0.05 and 0.06 mm.". This expression has been adopted because it is impossible to measure the vapor pressure accurately to the third decimal place. With this statement in the specification, it is believed there can be no objection to the use of "less than 0.06 mm." in the claims.

In proposed Claim 47 "45%" has been changed to "47%" as suggested by the Examiner.

The word "typographic", which the Examiner has considered new material (a view in which applicant does not acquiesce) has been eliminated and the consistency has been referred to in connection with ordinary "oil-varnish" printing inks which are referred to at the beginning of the specification. That applicant's ink has the consistency of such an ordinary printing ink is apparent from the statement at page 4, lines 17 and 18 of the specification.

Defendant's Exhibit E.

At the interview granted today the Principal Examiner indicated that claims 42 to 48 presented herewith are allowable and indicated that the specification should be amended to make definite the reference in the claims to the consistency of an ordinary oil-varnish ink. Such an amendment has been made on line 9 of page 1.

Since the Examiner has indicated that the claims now presented are allowable so that there will be no necessity for an appeal, applicant hereby authorizes the Examiner to cancel claims 11 to 41 inclusive on the allowance of claims 42 to 48 so that the application may be passed to allowance at an early date.

Respectfully submitted,

ALBERT E. GESSLER,

By Robert H. Byerly
His Attorney

Defendant's Exhibit E.

Div. 64 Room 4708 DEPARTMENT OF COMMERCE Paper No. 21
Address only "The Commissioner of Patents, Washington, D. C." and not any official by name. SC/hc
UNITED STATES PATENT OFFICE
WASHINGTON

Please find below a communication from the EXAMINER in charge of this application

Commissioner of Patents.

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Applicant Albert E.Gessler

Ser. No. 622,453
Filed July 14, 1932
For Printing ink and method of utilizing same.

OCT 10

In accordance with the provisions of Order No. 2308, dated March 12, 1917, which reads in part as follows:

. . . . . .

> Obvious informalities in the application may be corrected by the examiner, but said correction must be in the form of an amendment, approved by the Principal Examiner in writing, placed in the file, and made a part of the record. The changes specified in the amendment will be entered by the clerk in the regular way.

. . . . . .

the changes hereinafter specified, are made by the examiner in the application above identified.

Should these changes not be satisfactory to the applicant, appropriate amendment may be proposed under the provisions of Rule 78, provided the specification has not been printed.

The application has been amended as follows:

Preamble, line 4, "and method of utilizing same" has been erased as the claims are drawn to a printing ink.

Page 1, line 9, "Edition 1922" has been changed to "1922 Edition".

Page 1, line 9, commas have been inserted after "Bingham" and "Edition".

Page 3, line 22, "plasticiser" has been changed to "plasticizer".

Page 3, line 28, "and" has been inserted before "10 parts".

Page 3, line 17, "butyl ether" has been changed to "monobutyl ether" as was obviously intended.

Page 4, line 4, amendment c[1], line 16, "ordinary" has been inserted before "room".

SC

F. W. Mack
Examiner.

12 b
115

Defendant's Exhibit E.

ADDRESS ONLY THE COMMISSIONER OF PATENTS WASHINGTON, D.C.

Div. 64

Serial No. 622,453

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

October 10th 1935

MAILED OCT 10 1935

Albert E. Gessler, Assor.,

Your APPLICATION for a patent for an IMPROVEMENT in Printing Ink

filed July 14, 1932 has been examined and ALLOWED with 11 claims.

The final fee, THIRTY DOLLARS, WITH $1 ADDITIONAL FOR EACH CLAIM ALLOWED IN EXCESS OF 20, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent will be withheld, but the application may be renewed within one year after the date of the original notice with a renewal fee of $30 and $1 additional for each claim in excess of 20.

The office delivers patents upon the day of their date, on which date their term begins to run. The preparation of the patent for final signing and sealing will require about four weeks, and such work will not be begun until after payment of the necessary final fee.

When the final fee is paid, there should also be sent, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR, TITLE OF THE INVENTION, AND SERIAL NUMBER AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If it is desired to have the patent issue to an ASSIGNEE OR ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of the final fee.

After issue of the patent, uncertified copies of the drawings and specifications may be purchased at the price of TEN CENTS EACH. The money should accompany the order. Postage stamps will not be received.

The final fee will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

NOTICE.—WHEN THE NUMBER OF CLAIMS ALLOWED IS IN EXCESS OF 20, NO SUM LESS THAN $30 PLUS $1 ADDITIONAL FOR EACH CLAIM IN EXCESS OF TWENTY CAN BE ACCEPTED AS THE FINAL FEE.

Respectfully,

Commissioner of Patents.

Robert W. Byerly,
225 Broadway,
New York, N. Y.

62245

IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

Defendant's Exhibit E.

U. S. PATENT OFFICE

Paper 27

DIVISION

Application of Albert E. Gessler,
Printing Ink and Method of Utilizing Same,
Filed July 14, 1932,
Serial No. 622,453.

Div. 64
Room 4708

The Commissioner of Patents,

Washington, D. C.

Sir:-

Will you please permit JOHN MILTON JESTER, of 908 G Street, N. W., Washington, D. C., to inspect the file of this application.

Very respectfully,

Robert W. Byrne

Attorney for Applicant.

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622 1--

Defendant's Exhibit E.

RULE 78
MAR 17 1936
ORDERS No. 2000, 2801, 3311

U. S. PATENT OFFICE
MAR 17 1936
DIVISION

Application of Albert E. Gessler,
Printing Ink,
Filed July 14, 1933,
Serial No. 622,453.

Div. 64
Room 4702

U. S. PATENT OFFICE
RECEIVED
MAR 1936
DIVISION 64

The Commissioner of Patents,
Washington, D. C.

Sir:

It is requested that the following amendment be admitted under the provisions of Rule 78:

Specification, page 1, lines 1 and 2, after "printing inks" cancel "and methods of utilizing the same"--line 2, after "preparation" cancel "and utilization" --line 5, before "procedure" cancel "methods and" --between lines 7 and 8, cancel the paragraph beginning "In referring" and ending "commercial printing" inserted by amendment filed January 16, 1935 --line 8, after "printing inks" cancel "of the type so identified" inserted by amendment filed January 16, 1935 --line 9, after "or varnishes" cancel "have viscosities of 5 poises or above (Bingham, Fluidity and Plasticity 1922 Edition, page 8) and" inserted by amendment filed October 8, 1935 and by Examiner's amendment filed October 10, 1935, and substitute "have absolute viscosities of 5 poises or above at 25°C., measured by the method applied to varnish viscosities (Gardner's Physical and Chemical Examination of Paints, Varnishes, etc., Fifth Edition 1930, pp. 246, 152, 153) and" --line 30, after "volatility" cancel "and the dissolved substances are present therein in relatively low concentration" inserted by amendment filed March 13, 1934 --same line, after "Indeed" cancel "these characteristics are" inserted by amendment filed March 13, 1934, and reinstate "this characteristic is" --same line,

622453

Defendant's Exhibit E.

after "considered" cancel "of" inserted by amendment filed March 13, 1934, and reinstate "an"

Specification, page 2, line 1, before "rapid drying" cancel "free-flowing and" inserted by amendment filed March 13, 1934, and reinstate "a" --same line, after "hardening" cancel "are" inserted by amendment filed March 13, 1934, and reinstate "is" --line 2, before "rapid drying" cancel "low concentration of solids and" inserted by amendment filed March 13, 1934 --same line, before "inks" cancel "render" inserted by amendment filed March 13, 1934, and reinstate "renders" --line 9, before "cellulose compounds" cancel "low viscosity" inserted by amendment filed March 13, 1934 --lines 19 to 21, after "days" cancel "But I have also found" inserted by amendment filed June 15, 1933, and reinstate "This defect, however, may be remedied by the present invention, which involves a recognition of the principle" --lines 23 to 25, cancel sentence beginning "Consequently the print" and ending "these solvents" inserted by amendment filed June 15, 1933, and reinstate ", while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile" --line 27, before "vapor" reinstate "high" cancelled by amendment filed June 15, 1933 --line 28, after "pressures" cancel matter beginning "which increase" and ending "room temperatures" inserted by amendments filed June 15, 1933 and March 13, 1934, and reinstate "at elevated temperatures" --lines 29 and 30, cancel matter beginning "differ from" and ending "ink, and" inserted by amendment filed March 13, 1934, and reinstate "in contradistinction to lacquer solutions which require highly volatile solvents"

Defendant's Exhibit E.

B 2264

Specification, page 3, line 8, reinstate "or solvent mixtures" cancelled by amendment filed June 15, 1933-- line 17, after "may be" cancel "seem to be best obtained by the use of a main solvent, such as diethylene glycol monobutyl ether" inserted by amendment filed June 15, 1933 and by the Examiner's amendment filed October 10, 1935, and reinstate "further"

Specification, page 4, line 5, after "resins" cancel "that are solid, coherent and non-sticky when solvent free" inserted by amendment filed January 16, 1936 -- lines 13 to 16, reinstate "It may be desirable in some circumstances to omit the last two types of ingredients referred to in the illustrative formula, namely, those which have been added in order to offset extreme hardness and brittleness." cancelled by amendment filed June 15, 1933 -- after line 16, and before the paragraph inserted by amendment filed October 8, 1935, insert the following paragraph:

"Diethylene glycol monobutyl ether is a practically odorless, saturated, aliphatic or open-chain chemical compound of carbon, hydrogen and oxygen."

Page 4, line 24, after "use." add "This method of printing is not claimed herein as it forms the subject matter of my co-pending application, Serial No. 15,944, filed April 12, 1935, which is in part a continuation of this application."

Specification, page 5, line 5, after "print" cancel matter beginning "The ink is" and ending "through the paper to which it is applied" inserted by amendment filed January 16, 1936 --line 8, after "grease" cancel "heat" inserted by amendment filed January 16, 1936 --same line, after "odor" cancel "Successive sheets of printed material will not offset or stick together but the" inserted by amendment filed January 16, 1936, and reinstate "The" --line 9, after "surface" cancel "to which it is first applied" inserted by amendment filed January 16, 1936

Defendant's Exhibit E.

B 2371

Claim 44, line 14, change "liquid" to "solid"

Add the following claims:

85

~~80.~~ A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being an aliphatic chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C. which, at 20°C., is ~~less than 0.05 mm. of mercury~~, and, at 150°C., approximates that of ethyl alcohol at ordinary temperatures.

~~81.~~ A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a saturated chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which,

B 2275

as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C. at 20°C., is ~~less than 0.06 mm. of mercury~~, and, at 150°C., approximates that of ethyl alcohol at ordinary temperatures.

10 ~~61~~. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20°C. as low as the vapor pressure of diethylene glycol monobutyl ether ~~of less than 0.06 mm. of mercury~~ at 20°C., and the major part of the liquid component having an open-chain structure and a vapor pressure which at 150°C. approximates that of ethyl alcohol at ordinary temperatures, and forming a stable solution with the solid component.

11 ~~58~~. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20°C. as low as the vapor pressure of diethylene glycol monobutyl ether ~~of less than 0.06 mm. of mercury~~ at 20°C., and the major part of the liquid component having a vapor pressure which at 150°C. approximates that of ethyl alcohol at ordinary temperatures, and being a saturated compound forming a stable solution with the solid component.

12-15

D22[illegible]3 133

Defendant's Exhibit E.

REMARKS

A careful review of the application since allowance indicates that some minor corrections are necessary in the specification and claims. It is requested that the above amendment making these corrections be entered under Rule 78.

The present amendment to the specification is for the purpose of placing the specification as nearly as possible in the form in which it was originally filed. A number of changes in the original specification, which were made in the course of the prosecution and which are not necessary to support the allowed claims, have been eliminated. As these changes are unnecessary, it is believed desirable to avoid the possibility of any argument as to new matter which might be based on them.

The only change made in the specification, apart from those directed to restoring it to its original condition, is a statement inserted on page 4 as to certain chemical properties of the solvent given in the specific example which have proved of value in practical use of the ink described in the example.

New Claims 49, 50, 51 and 52 are of a scope intermediate between that of the broadest allowed claims, 42, 44, and the narrowest allowed claims, 45, 46. Claims 49 and 50 are identical with allowed Claim 42, except that each of them introduces a limitation on the chemical structure of the solvent which has proved important in practice. Claims 51 and 52 similarly describe two species within the scope of Claim 44. It is believed that the

Defendant's-Exhibit E.

Examiner will recognize that applicant is entitled to fortify his protection by claims of a more limited scope within the scope of the allowed claims. In view of the allowance of Claims 42 and 44, Claims 49 to 52 are clearly allowable without an additional search.

It is requested that this amendment be entered promptly in order that the application may be passed to issue.

Respectfully submitted,

ALBERT E. GESSLER,

By _____
His Attorney.

Washington, D. C., March 16, 1936.

ENTRY RECOMMENDED.
UNDER RULE 78.

EXAMINER.

ENTRY APPROVED

ACTING COMMISSIONER OF PATENTS

Defendant's Exhibit E.

Rv. 64 Room 4708

Address only
The Commissioner of Patents,
Washington, D. C.,
and not any official by name

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

Paper No. 24

All communications respecting this application should give the serial number, date of filing, and name of the applicant

March 18, 1936

MAR 19 1936

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Applicant: Albert E. Gessler

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink

The amendment proposed has been entered under Rule 78.

Commissioner of Patents

622153 136

Defendant's Exhibit E.

IN THE UNITED STATES PATENT OFFICE

Application of Albert E. Gessler,
Printing Ink,
Filed July 14, 1932,
Serial No. 622,453.

Div. 6
Room 4[illegible]

[illegible] 1936

U. S. PATENT OFFICE
MAR 31 1936
ISSUE DIVISION

STATE OF NEW YORK,)
: ss:
COUNTY OF NEW YORK,)

ALBERT E. GESSLER, whose application for Letters Patent for Improvements in Printing Ink, Serial No. 622,453, was filed in the United States Patent Office on July 14, 1932 being duly sworn, deposes and says that the subject-matter of the amendments filed October 8, 1935 and March 16, 1936 was part of his invention, was invented before he filed his original application, above identified, for such invention, was not known or used before his invention, was not patented or described in a printed publication in any country more than two years before his application, was not patented in a foreign country on an application filed by himself or his legal representatives or assigns more than twelve months before his application, was not in public use or on sale in this country for more than two years before the date of his application, and has not been abandoned.

Albert E. Gessler

Subscribed and sworn to before me
this 28th day of March, 1936.

Arthur C. Jacks

622453 137

Defendant's Exhibit E.

APR 11 1936

U.S. PATENT OFFICE

PETITION FOR RENEWAL

RECEIVED APR 13 1936 DIVISION 64

TO THE COMMISSIONER OF PATENTS:

Your petitioner, ALBERT E. GESSLER, a citizen of the United States, and a resident of Ardsley-on-Hudson, in the County of Westchester, and State of New York, whose Post Office address is c/o The International Printing Ink Corporation, Research Laboratories, 432 West 45th Street, New York City, New York, represents that on July 14, 1932, he filed an application for Letters Patent for Improvements in Printing Ink, Serial No. 622,453, which application was allowed October 10, 1935, but that he failed to make payment of the final fee within the time allowed by law. He now makes renewed application for Letters Patent for said invention, and prays that the original specification and oath may be used as a part of this application.

Signed at New York, in the County of New York, and State of New York, this 10th day of April, 1936.

ALBERT E. GESSLER

By Robert W Byerly

His Attorney

53 138

Defendant's Exhibit E.

APR 11 36 188784 E - Check -

ROBERT W. BYERLY
COUNSELOR AT LAW
220 BROADWAY

RALPH H. WATSON
APR 11 1936
U.S. PATENT OFFICE

NEW YORK April 10, 1936.

Application of Albert E. Gessler,
Printing Ink,
Filed July 14, 1932,
Serial No. 622,453.

The Commissioner of Patents,
Washington, D. C.

Sir:

I am enclosing herewith Petition for Renewal, check for $30.00 in payment of renewal fee, and amendment in the renewal application.

Very respectfully,

Robert W Byerly

Encls.

622453 M. 41

Defendant's Exhibit E.

Renewal Application of Albert E. Gessler, Printing Ink, Filed July 14, 1932, Serial No. 622,453.

Div. 64
Room 4708

The Commissioner of Patents,

Washington, D. C.

Sir:

I hereby amend as follows:

Add the following claims:

"53. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20°C. so low that it has a very slow rate of evaporation at this temperature and the major part of the liquid component having an open-chain structure and a vapor pressure at 150°C. so high that its rate of evaporation at this temperature approximates that of ethyl alcohol at ordinary temperature, and forming a stable solution of the solid component.

"54. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20°C. so low that it has a very slow rate of evaporation at this temperature and the major part of the liquid component having ~~an open-chain structure and~~ a vapor pressure at 150°C. so high that its rate of evaporation at this temperature approximates that of ethyl alcohol at ordinary temperature, ~~and forming a stable solution of the solid component.~~ and being a saturated compound forming a stable solution with the solid component.

"55. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having at 20°C. a sufficiently low vapor pressure to make the ink stable for all ordinary printing conditions

and the major part of the liquid component having at 150°C. a sufficiently high vapor pressure to make its rate of evaporation at this temperature approximate that of ethyl alcohol at ordinary temperature, and forming a stable solution with the solvent.

"56. A printing ink comprising a coloring material and a vehicle therefor containing a thickening agent and a solvent with sufficiently low vapor pressure at 20°C. to make the ink stable for all press-room printing conditions and a sufficiently high vapor pressure at 100°C. to permit rapid drying of the ink by evaporation of the solvent by the application of heat to material on which the ink is printed.

"57. A printing ink consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink - the solid component being low-viscosity nitrocellulose, and substantially all the liquid component being composed of slightly volatile solvents and non-volatile plasticizers for nitrocellulose and having approximately the following composition: 55 parts of slightly volatile solvent for nitrocellulose having a vapor pressure which, at 150°C., approximates that of ethyl alcohol, and from 10 to 20 parts of a non-volatile plasticizer for nitrocellulose.

"58. A printing ink consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the

consistency of an ordinary oil-varnish printing ink, the solid component being low-viscosity nitrocellulose and the liquid component having approximately the following composition: one part of substantially non-volatile plasticizer for nitrocellulose, and three parts of a slightly volatile solvent for nitrocellulose.

"59. A printing ink consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, the solid component being low-viscosity nitrocellulose, and the liquid component having approximately the following composition: over 50% of slightly volatile solvent for nitrocellulose, and over 25% of substantially non-volatile plasticizer for nitrocellulose.

"60. A printing ink consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component present in the liquid component in sufficient quantity to give the ink the consistency of ordinary oil-varnish ink, the vehicle comprising low-viscosity nitrocellulose, a slightly volatile solvent for nitrocellulose, a non-solvent softener for nitrocellulose and a substantially non-volatile solvent plasticizer for nitrocellulose, the slightly volatile solvent being a major proportion of the liquid component of the vehicle and the solvent plasticizer amounting to at least 15% of the liquid component.

"61. A printing ink consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of ordinary oil-varnish ink, the solid component being low-viscosity nitrocellulose and the liquid component comprising a major proportion of slightly volatile solvent for nitrocellulose and a substantially non-volatile plasticizer for nitrocellulose amounting to over 15% of the total liquid component and over one-fifth of the amount of nitrocellulose and to about one-fifth of the volatile part of the liquid component."

REMARKS

The above amendment presents new claims which are believed to be necessary to cover adequately all the new and useful features of the invention described in this application.

While the vapor pressure of the preponderant solvent specified in the allowed claims is a novel and important feature of applicant's ink as has been pointed out in the arguments filed in previous amendments, in view of the action of the Office on other applications there appears to be no reason why applicant should be limited to a numerical statement of the vapor pressure.

Defendant's Exhibit E.

New Claims 53 and 54 are based on allowed Claims 51 and 52, but specify the required vapor pressures by their effect on evaporation rate rather than numerically. It is apparent from the arguments previously presented that the value of applicant's ink arises from the different evaporation rates of the solvent at different temperatures, and it is believed that at least some claims should refer directly to evaporation rates. Claims 53 and 54 distinguish from the references in the same way as Claims 51 and 52 and differ from them only in specifying a characteristic of the solvent which is even more directly related to the utility of the ink.

New Claim 55 is based on allowed Claim 44 and differs from it only in specifying the vapor pressures by their effect on the evaporation rate instead of numerically. This claim distinguishes from the references in the same way as Claim 44.

New Claim 56 is somewhat broader, as it specifies the vapor pressures by their effect on the ink and thus avoids the necessity of specifying proportions of ingredients. As already fully pointed out, no one of the references describes an ink having the characteristics specified in Claim 56 and, in view of the practical importance of the invention, it is submitted that applicant is entitled to a claim of this scope.

A feature of applicant's ink not covered by the allowed claims is the proportioning of the solvent and plasticizer. This proportioning has been found to be important in an ink in which the binder is nitrocellulose and to be effective in producing a quick-drying ink which

does not dry on the press even when the slightly volatile solvent used is outside the vapor pressure range specified in the allowed claims.

New Claims 57 to 61 specify the proportion of the substantially non-volatile plasticizer in relation to other ingredients of the ink. The proportions specified as based on the example given in the specification have been carefully compared with those of the inks of all the references and have been found to distinguish from all of them. In connection with these claims, it should be noted that the particular example given in the specification includes two softeners or plasticizers both of which are substantially non-volatile and one of which, dibutyl phthalate, is a solvent plasticizer for nitrocellulose, while the other, blown castor oil, is a softener, but not a solvent, for nitrocellulose. Claim 60 specifies the use of both the two sorts of softeners.

Favorable consideration of the new claims and re-allowance are requested.

Respectfully submitted,

ALBERT E. GESSLER

By Robert W Byerly

His Attorney

New York City, April 10, 1956.

Defendant's Exhibit E.

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MAY 4 1936

U.S. PATENT OFFICE

Renewal Application of Albert E. Gessler, Printing Ink, Filed July 14, 1933, Serial No. 682,455.

Div. 64
Room 4708

U. S. PATENT OFFICE
RECEIVED
MAY 5 1936
DIVISION 64

The Commissioner of Patents,
Washington, D. C.

Sir:-

I hereby amend as follows:

Claim 53, last line, after "solution" change "of" to "with"

Claim 54, lines 13, 14, cancel "an open-chain structure and" -- last two lines, change "and forming a stable solution of the solid component" to "and being a saturated compound forming a stable solution with the solid component"

REMARKS

The above amendment is made to correct clerical errors contained in the amendment dated April 10, 1936.

Respectfully submitted,

ALBERT E. GESSLER

By Robert M. Hyatt
His Attorney

New York City,
May 2, 1936.

Div. 64 Room 4708

Address only "The Commissioner of Patents, Washington, D. C." and not any official by name. SC/hc

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

Paper No. 29

All communications relating this application should give the serial number, date of filing, and name of the applicant

Please find below communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Applicant: Albert E.Gessler

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink

Robert W. Byerly,
225 Broadway,
New York, N. Y.

MAIL
JUN 26 1936

In response to amendments filed Apr. 11 and May 4, 1936.

Claim 56, line 6, "permit" is impositive. Ex parte Jones et al 353 O. G. 4.

Claims 53, 54, 55 and 56 are rejected as unpatentable over Clewell, Doughty, Middleton or Schneider of record, all of whom have solvents which may be considered low vapor pressure solvents.

Such terms as "low", "high", "slow" are comparative and indefinite and are not patentable distinctions. Note In Re Short, 432 O. G. 513.

Applicant has only one specific solvent disclosed and apparently has no basis for claiming low vapor pressure solvents broadly.

Claims 57, 58, 59, 60 and 61 are rejected as unpatentable over 360,815 of record who uses low vapor pressure solvents together with plasticizers such as blown castor oil. The proportions are thought to be a matter of choice although in the first example of 360,815, a relatively small amount of blown castor oil is used relatively to the solvent.

In claims 58 and 59 the proportions of "one part to three parts" and "over 50%" and "over 25%" are not found in the description as critical percentages, and the exact basis therefor is not clear.

Likewise "over 15%" and "over 1/5" and "about 1/5"

in claims 60 and 61 are not found in the original description.

As no new references have been cited, the rejection of claims 53 to 61 inclusive, is made final.

The remaining claims stand allowed.

Examiner.

Div. 64 Item 4708 DEPARTMENT OF COMMERCE

SC/ho

Please find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

Robert W. Everly,
225 Broadway,
New York, N. Y.

Applicant: Albert E. Gessler

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink

MAILED
SEP 2 - 1936

Supplemental to office action of June 26, 1936.

Additional reference is cited:

Brewer et al, "Vapor Pressure of Some Commercial High-Boiling Organic Solvent, pages 1, 4, 10, 11, 17 and 18 (1936), copy in Div. 64 (134-56)

This action is supplemental to the Office action of June 26, 1936 and accordingly the final rejection is withdrawn. This supplemental action is made in view of the Brewer et al publication which gives some recent data upon the vapor pressures of terpineol and terpinyl acetate, and which were not available to the examiner at the time of the last Office action.

Upon reconsideration, claim 1, (original claim 42) is rejected as directly readable upon Doughty 1,459,096 of record who discloses the use of a resin dissolved in either terpineol or terpinyl acetate.

Brewer et al disclose terpineol as having a vapor pressure of .05 mm. of mercury at 20° C. and a vapor pressure of 100 mm. at 150° C. They also disclose terpinyl acetate as having a vapor pressure of .025 mm. of mercury at 20° C. and avapor pressure of 56 mm. at 150° C. The broad term of "approximates those of ethyl alcohol at ordinary temperatures" is thought to be readable upon these vapor pressures of Doughty at 150° mm.

Claim 2 (original claim 43) is rejected similarly

as directly readable upon Doughty who uses four parts of rosin to one part of the solvent and thus uses 80% which is considered to be "substantially 75%" as claimed.

Claim 3 (original claim 44), is likewise rejected as directly readable upon Doughty.

Claim 6 (original claim 47) is rejected as substantially met by Doughty who preferably uses 20% of resin, but states on page 2, lines 45 to 48, that the proportions of resin and solvent may be varied to produce a vehicle of proper consistency.

Claim 7 (original claim 48) is rejected as substantially met by Doughty who uses a resin, and applicant considers resins and cellulose as equivalents.

Claims 55 and 56 are additionally rejected as directly readable upon Doughty.

Claims 53 to 61 inclusive stand rejected for the reasons and references as stated in the last Office action.

Claims 4, 5, 8, 9, 10 and 11 are allowable as now advised.

S.C

Sept 2.1936

V. J. R.

Examiner.

Defendant's Exhibit E.

VAPOR PRESSURE

of

Some Commercial High-Boiling Organic Solvents

Copyright, 1936, Reinhold & Company, Philadelphia, Penna.

Any one who has had occasion to consult the chemical literature for vapor pressure data on organic solvents realizes the scarcity of such information, and it was for this reason that the following investigation was carried out. The purpose of the writer has been to obtain sufficient data to construct accurate vapor pressure-temperature curves in the region 20° C. to 150° C. for eleven commercial high-boiling organic solvents. The samples of solvents used were not specially purified compounds, but were technical products as actually used in the chemical industries.

Source of Materials

The samples of solvents upon which the vapor pressure measurements were made were obtained from the following sources:

Substance	Source
"Carbitol", (Diethylene-glycol mono-ethyl ether)	Carbide and Carbon Chemicals Corp.
"Butyl Carbitol", (Diethylene glycol mono-butyl ether)	Carbide and Carbon Chemicals Corp.
Dimethyl phthalate	Commercial Solvents Corporation
Dibutyl phthalate	Commercial Solvents Corporation
Terpineol	E. I. du Pont de Nemours & Co.
Terpenyl acetate	E. I. du Pont de Nemours & Co.
Benzyl alcohol	E. I. du Pont de Nemours & Co.
Benzyl acetate	E. I. du Pont de Nemours & Co.
"Hexalin", (Cyclohexanol)	E. I. du Pont de Nemours & Co.
"Tetralin", (Tetrahydronaphthalene)	E. I. du Pont de Nemours & Co.
"Decalin", (Decahydronaphthalene)	E. I. du Pont de Nemours & Co.

Identification of Materials

On each sample of solvent a sufficient number of physical constants was obtained to establish its identity definitely. In all cases the boiling point at atmospheric pressure, the density, and the refractive index were determined. In addition to these constants, the comparison of the vapor pressure data recorded in the literature (where available) with the results obtained by the writer has a certain weight in confirming the identity of the samples. Tables 1, 2, and 3 give the constants of the materials used, together with a comparison with recorded data.

Defendant's Exhibit E.

Table #4
"Carbitol"

Temp °C	Vapor pressure mm Hg
39.4	0.8
45.5	0.9
50.4	1.3
55.0	1.5
61.0	1.8
65.6	2.6
70.8	3.7
76.5	5.5
79.7	6.4
89.9	11.7
100.9	20.6
111.7	34.7
119.8	51.1
135.2	90.6
151.0	183.2

Table #5
"Butyl Carbitol"

Temp °C	Vapor pressure mm Hg
59.2	0.2
53.7	0.3
60.5	0.4
62.9	0.5
66.9	0.7
70.6	1.4
78.7	1.7
82.4	2.0
88.0	3.1
92.3	4.2
100.4	6.4
109.1	9.9
117.6	15.0
126.8	22.9
144.9	50.1
152.9	69.3

Table #6
Dimethyl Phthalate

Temp °C	Vapor pressure mm Hg
82	0.3
85	0.4
90	0.5
99	0.6
103	0.9
105.3	1.2
107.4	1.6
110.6	1.7
113.0	2.0
118.0	2.4
118.8	2.5
123.8	3.3
129.5	4.4
136.9	6.1
146.5	9.7
146.9	9.7
150.6	11.5
151.0	11.6

Table #7
Dibutyl Phthalate

Temp °C	Vapor pressure mm Hg
89	0.1
98.8	0.4
106.1	0.6
111.3	0.8
122.5	0.9
132.0	1.0
134.5	0.9
137.2	1.0
138.0	1.0
141.0	1.1
141.2	1.1
144.8	1.2
145.4	1.1
147.5	1.3
148.0	1.2
149.5	1.3
150.0	1.4
151.0	1.3
153.5	1.5
162.9	2.1
164.4	2.2
167.2	2.8
168.0	2.8
168.6	2.9
171.8	3.2
176.3	4.1

Table #8
Terpineol

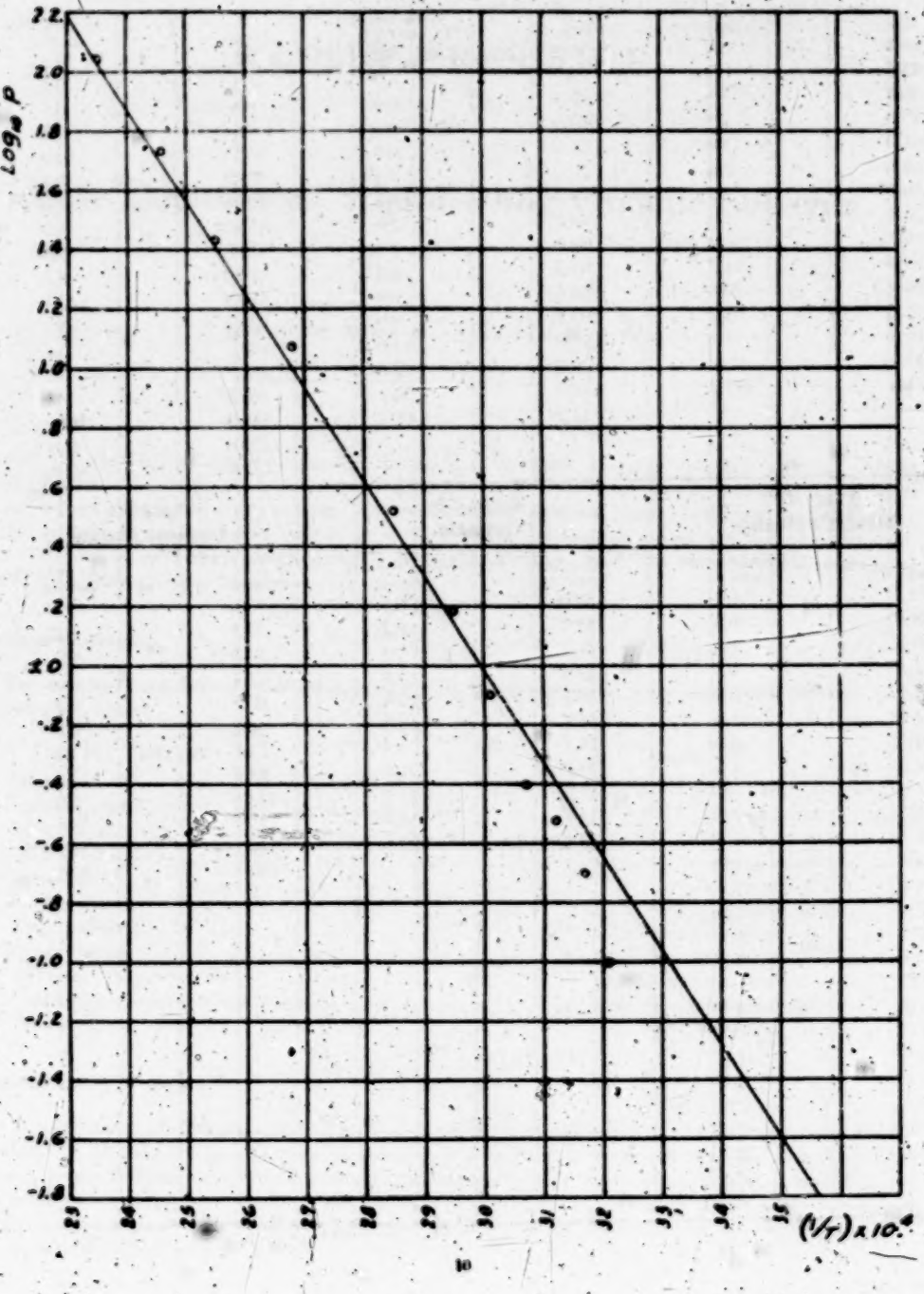
Temp °C	Vapor pressure mm Hg
39.0	0.1
42.0	0.2
47.2	0.3
53.4	0.4
58.7	0.8
65.7	1.5
78.3	3.3
99.7	11.7
118.5	27.2
133.5	53.5
152.8	109.1

Table #9
Terpenyl Acetate

Temp °C	Vapor pressure mm Hg
37.0	0.1
52.5	0.2
55.0	0.3
57.4	0.3
60.8	0.5
64.2	0.8
74.1	1.4
82.8	2.3
102.3	7.0
119.8	16.6
134.5	31.3
150.2	59.0

Defendant's Exhibit K.

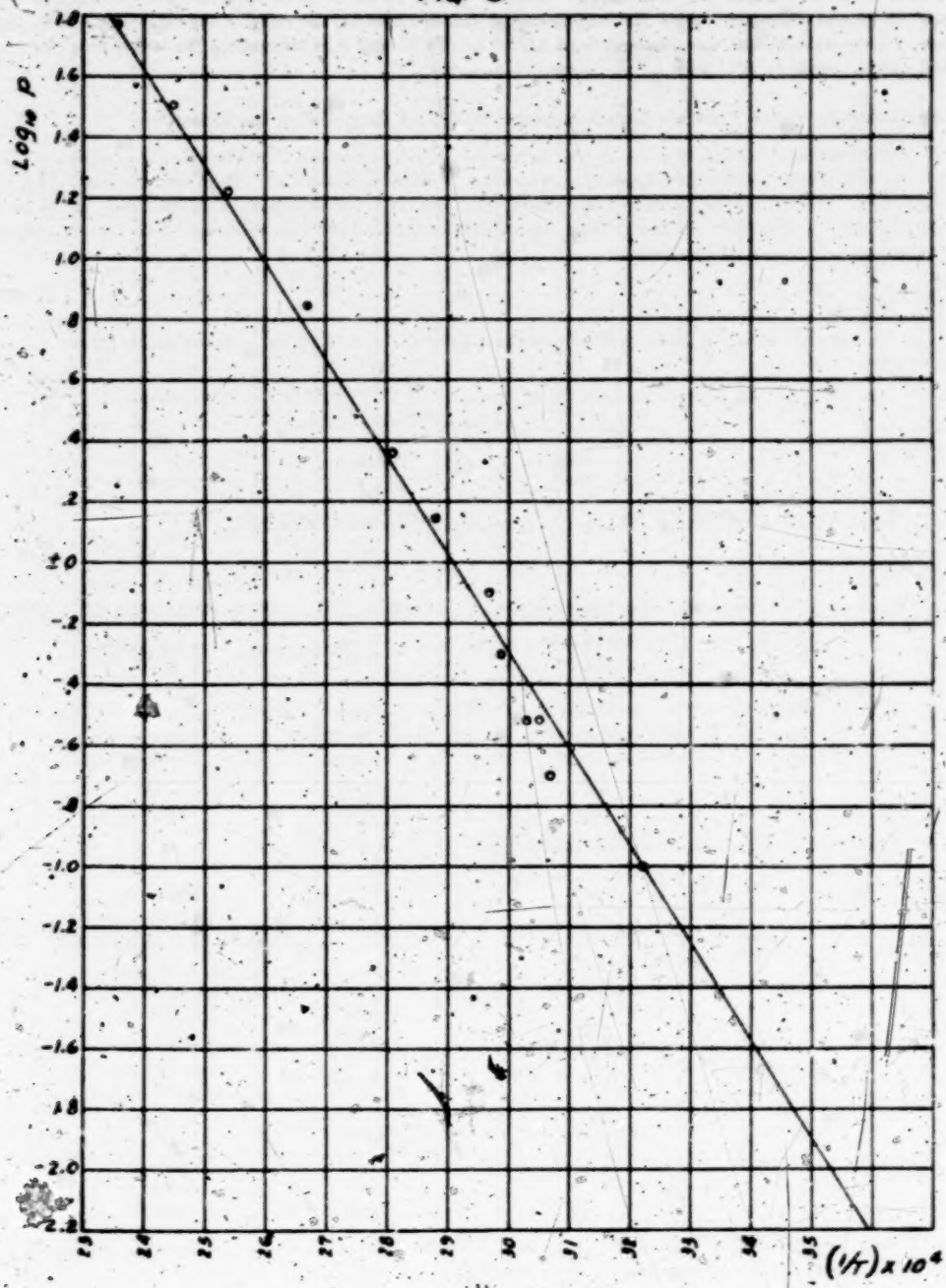
FIG. 5 TERPINEOL



Defendant's Exhibit E.

FIG 6

TERPENYL ACETATE.



Defendant's Exhibit E.

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E

Most of the data are in agreement with this equation, but occasionally there is a slight tendency to deviate from the straight line, especially at pressures below 1 mm. This tendency is most pronounced in the case of dibutyl phthalate, where the measurements below 1 mm are displaced to the right of the line. However, a good straight line was obtained from 135°C to 176°C, and it is believed by the writer that extrapolation may be made to 0°C with a fair degree of accuracy.

Comparison of Vapor Pressure Determinations with Data Reported in the Literature

The meagreness of the vapor pressure data reported in the chemical literature on the compounds which have been the subject of this investigation is surprising. However, some data are available (usually on pure compounds), and are quite generally in agreement with the vapor pressure determinations made by the writer. The following is a review of the available measurements taken from the literature, with a comparison of the measurements made by the writer:

"Carbitol"

J. G. Davison[1] gives a vapor pressure-temperature curve for "Carbitol". Some points taken from the curve are

Temp., °C	Pressure, mm Hg
20	0.14
50	1.1
100	18.0
140	100.0

If these results are plotted on Figure 1, a very close agreement is observed.

Terpineol

Pickett and Peterson[4] give vapor pressure data on a-terpineol. The portion of their data up to 172°C is

Temp. °C	Pressure, mm Hg	Temp. °C	Pressure, mm Hg
83.8	5.9	106.6	19.2
89.9	8.1	107.3	20.1
90.6	8.6	107.9	20.6
94.7	9.6	108.2	20.7
100.0	12.6	140.9	72.6
100.9	12.7	142.3	73.7
105.8	18.6	172.0	207.2

and is found to be in agreement with our results.

Benzyl Alcohol

Data on benzyl alcohol exist in several places. The data given by Kahlbaum[5], and recorded in Landolt-Bornstein, follows:

Temp. °C	Pressure, mm Hg	Temp. °C	Pressure, mm Hg
60.9	1	109.7	25
67.8	2	113.4	30
72.9	3	116.7	35
77.2	4	119.6	40
80.8	5	122.2	45
92.6	10	124.4	50
99.9	15	133.9	75
105.3	20	141.3	100
		152.1	150

This shows satisfactory agreement with our data. The data reported for benzyl alcohol in International Critical Tables apparently comes from the same source.

Defendant's Exhibit E.

Hexalin

Some isolated values are given in the literature for the vapor pressure of "Hexalin". Weissenberger & Schuster[1] give 0.42 mm at 20°C. This does not agree with our data.

Tetralin

International Critical Tables[2] gives the following data of Herz and Schuftan[3]:

Temp. °C	Pressure, mm Hg
100	26.3
140	118
160	219

This agrees with our experimental measurements.

Limler[4] gives some results of the measurement of vapor pressure of tetralin:

Temp. °C	Pressure, mm Hg
—2.4	0.015
—1.2	0.0235
25.0	0.40
65.0	0.83

The value 0.40 mm at 25°C checks our findings; however, the value at 65°C, i.e., 0.83 mm, quite evidently is not correct. This is apparently a typographical error.

Decalin

Weissenberger, Henke and Sperling[5] give a value of 0.6 mm Hg at 20°C for "Decalin". We find 0.8 mm at 20°C.

The data of Herz and Schuftan[3], given in International Critical Tables agrees with the values found by us.

Values for Vapor Pressures at 20°C and 150°C

As a matter of convenience we give in Table 15 interpolated (or extrapolated) values for the vapor pressure of the eleven samples of solvents at 20°C and 150°C. These data have been obtained from plots of the experimental data according to the Clapeyron equation (logarithm of vapor pressure against reciprocal of absolute temperature). The number of significant figures used expresses the probable degree of accuracy.

Table #15

Values for Vapor Pressures at 20°C and 150°C

Substance	Vapor pressure at 20°C, mm Hg	Vapor pressure at 150°C, mm Hg
"Carbitol"	0.13	174
"Butyl Carbitol"	0.020	66
Dimethyl phthalate	0.003	11.5
Dibutyl phthalate	0.001	1.4
Terpineol	0.05	100
Terpenyl acetate	0.025	56
Benzyl alcohol	0.10	132
Benzyl acetate	0.13	110
"Hexalin"	0.8	560
"Tetralin"	0.28	151
"Decalin"	0.8	240

Defendant's Exhibit E.

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E

Renewal Application of Albert E. Gessler, Div. 64
Printing Ink, Room 4708
Filed July 14, 1932,
Serial No. 618,453.

U. S. PATENT OFFICE
RECEIVED

The Commissioner of Patents,
Washington, D. C.

Sir:

In view of the supplemental action, dated September 2, 1936, withdrawing the final rejection and citing new art, it is presumed that the statutory period for reply runs from September 2, 1936, rather than from June 26, 1936.

Respectfully,

Robert P. Byerley
Attorney for Albert E. Gessler

New York City, December 11. 1936.

Defendant's Exhibit E.

64 Room 4708

Address only "The Commissioner of Patents, Washington, D. C." and not to any official by name

SC/hc

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASH ... DC

Paper No. 32

All communications regarding this application should give the serial number, date of filing, and name of the applicant

Please find below a communication from the EXAMINER in charge of this application.

... 11-6-36

Commissioner of Patents.

Applicant: Albert E. Geasler

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Ser. No. 622,453
Filed July 14, 1932
For Printing Ink

MAILED
DEC 15 1936

In response to letter filed Dec. 12, 1936.

In view of the withdrawal of the final rejection, the statutory period for a reply runs from Sept. 2, 1936.

S.C.

Examiner.

Defendant's Exhibit E.

33
E

2 937 Renewal Application of Albert E. Gessler, Printing Ink, Filed July 14, 1938, Serial No. 622,455. Div. 54 Room 4706

The Commissioner of Patents,

Washington, D. C.

Sir:

In response to the Office Action of June 26, 1936 and the supplemental Action of September 2, 1936, I hereby amend as follows:

Cancel the insert following line 16, page 4 of the Specification, made by amendment of October 8, 1935, and insert in place thereof the following:

"The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures. These important properties of diethylene glycol monobutyl ether, the preponderant solvent constituting the major part of the liquid component of the ink in the example given, may, for comparative purposes, be indicated numerically in terms of its vapor pressure at different temperatures which, as determined by Brewer and Gardner in "Industrial and Engineering Chemistry", Vol. 29, No. 2, p. 179, February, 1937 are as follows:

At 20°C.		0.02 mm. of mercury
At 100°C.		6.4 mm. of mercury
At 150°C.	about	60.0 mm. of mercury

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at ordinary room temperature. The vapor pressures of my preponderant solvent

Defendant's Exhibit E.

B 2266

at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid, according to Brewer and Gardner, is 0.45 mm. at 100°C. and 1.4 mm. at 150°C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100°C. or 150°C.

Claim 1 (original 42), line 2 from the end, change "less than 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C."

Claim 2 (original 43), line 3 from the end, change "less than 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C."

Claim 3 (original 44), lines 10-11, change "of less than 0.06 mm. of mercury" to "at 20°C. as low as that of diethylene glycol monobutyl ether"

Claim 4 (original 45), next to last line, change "below 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C.,"

Claim 6 (original 47), line 7, change "below 0.06 mm." to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C.,"

6 2244 53

B 2276

Claim 7 (original 49), lines 11-12, change "less than 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C.,"

Claim 8 (original 49), line 5 from the end, change "less than 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C."

Claim 9 (original 50), line 2 from the end, change "less than 0.06 mm. of mercury" to "as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C."

Claim 10 (original 51), line 11, change "of less than 0.06 mm. of mercury" to "at 20°C. as low as the vapor pressure of diethylene glycol monobutyl ether"

Claim 11 (original 52), line 11, change "of less than 0.06 mm. of mercury" to "at 20°C. as low as the vapor pressure of diethylene glycol monobutyl ether"

Cancel Claims 53 to 56, inclusive, and insert in place thereof, the following claims:

12 "53. A printing ink adapted for use on paper, comprising a coloring material in a vehicle containing essentially a binder for the coloring material and a solvent for the binder, said binder forming a stable solution in said solvent and being present in amount sufficient to give the ink the consistency of ordinary oil-varnish printing inks, and to protect the coloring material against being rubbed off when the ink is applied by an ordinary printing press, and substantially all of said solvent having a vapor pressure at 20°C. as low as that of diethylene glycol monobutyl ether at 20°C., and developing such a marked increase in vapor pressure at elevated temperatures of 100°C. or above, to which printed paper can be subjected, that its vapor pressure at 150°C. approximates that of ethyl alcohol at ordinary temperatures and that it practically immediately

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evaporates from a thin film of ink at such temperatures, whereby said ink is stable on the printing press and capable of being immediately dried upon the application of heat following the printing operation.

"58. A printing ink consisting of pigment dispersed in an organic viscous vehicle, consisting of a liquid component and a solid component -- the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and being dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, and to bind the pigment to paper when the ink is applied by an ordinary printing press, and substantially all of the liquid component having a vapor pressure at 20°C. which is as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C. and the major part of the liquid component having a vapor pressure which at 150°C. approximates that of ethyl alcohol at ordinary temperatures, and forming a stable solution with the solid component.

"64. A printing ink comprising a coloring material in a vehicle consisting of a solid component, composed principally of a binder of the group consisting of natural and synthetic resins and cellulose esters, and a liquid component, composed principally of volatilizable solvent for the binder, said binder being present in amount approximately one-half to two-thirds of said liquid component, by weight, and said solvent having a vapor pressure at 20°C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20°C., and having a vapor pressure at 150°C. equivalent to that of ethyl alcohol at room temperature."

Cancel Claims 57 through 61, inclusive, and insert in place thereof the following claim:

Defendant's Exhibit E.

A printing ink having a consistency suitable for ordinary printing and comprising a coloring material and a vehicle therefor including a liquid component and a solid component, said solid component being principally a binder for said coloring material, and said liquid component consisting essentially of a minor proportion of an agent adapted to prevent brittleness of the binder and a major proportion of a volatilizable solvent having vapor pressure at 20°C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20°C., and a vapor pressure at elevated temperature of 150°C. equivalent to that of ethyl alcohol at ordinary room temperature.

Defendant's Exhibit E.

REMARKS

The Examiner's courtesy in granting the inventor and his attorneys an interview is appreciated, and in accordance with the understanding at the interview, the claims have been revised, and are all believed to be now clearly allowable.

Claims 1, 2, 3, 6 and 7 (formerly 42, 43, 44, 47 and 48), which were all once allowed, have been amended to recite a solvent which possesses a vapor pressure at 20°C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20°C.

As pointed out at the interview, the application as originally allowed, recited the vapor pressure of diethylene glycol monobutyl ether as between 0.05 and 0.06 mm at 20°C. This figure for the vapor pressure was obtained by the method of Crater, as described in "Industrial and Engineering Chemistry", Vol. 21, p. 674, July, 1929. However, due to the fact that there is no generally accepted method of determining vapor pressures at low temperatures, which affords an absolute standard, and due also to the fact that different samples of solvents may contain substantial traces of impurities such as water, which affect the results, the Specification has been revised to specify the figures recently reported by Brewer and Gardner in "Industrial and Engineering Chemistry" for February, 1937. However, it should be noted that there are certain scientific reasons for possible inaccuracies in the Brewer & Gardner determinations. Therefore, the figures given in the Specification must be taken, not as absolute standards, but rather as the vapor pressure figures recently obtained by Brewer and Gardner, and comparable with other figures in their publication.

Defendant's Exhibit E.

claims 1, 2, 5, 6 and 7, now distinguish from the references in the recital of a printing ink having the consistency of ordinary oil-varnish printing inks and based upon a solvent having a vapor pressure at 20°C. as low as that of diethylene glycol monobutyl ether at 20°C., and having a vapor pressure at 150°C. which approximates that of ethyl alcohol at ordinary temperatures. On the basis of the Brewer & Gardner figures, Doughty's preferred solvent has a vapor pressure of .05 mm. at 20°C., as compared to .02 mm. for diethylene glycol monobutyl ether. The Middleton and Clewell patents are even less pertinent than Doughty, relate merely to thin inks for automatic numbering machines for applying footage numbers to motion picture film, and have been fully discussed at pages 9, 11 and 12 of the amendment filed October 8, 1935. The Schneider patent discloses only plasticizers which do not exhibit the specified vapor pressures at 150°C.

The Examiner's objection to the breadth of the claims was discussed at the interview, when it was agreed that the definition of the physical characteristics of the preferred solvent is sufficient to enable those skilled in the art to select appropriate substitutes.

In order to make allowed Claims 4 and 8 to 11 agree with the approved terminology, these claims have been similarly amended with regard to the recital of the vapor pressures.

Defendant's Exhibit E.

Accordingly, it is believed that all of Claims 1 to 11, which were once allowed, are now properly allowable as indicated at the interview.

Two new claims, numbered 62 and 63, were discussed at the interview, and were deemed allowable since they incorporate the features of the other claims heretofore discussed, and are somewhat more precise in other respects. The allowability of new Claims 64 and 65 is further emphasized by the recital of proportions. With regard to Claim 65, which replaces Claims 57 through 61, inclusive, it is noted that the British Patent 360,815 does not disclose the basic features of these claims, for the reasons pointed out above, and under these circumstances it is submitted that applicant is entitled to specific claims to the embodiment including the ink containing the ingredient which eliminates brittleness in the product, in accordance with In re Laursen, 24 U.S.Pat.Q. 11, 17, C.C.P.A.

Since applicant has complied with all the Examiner's suggestions made at the interview, and has placed the case in condition for immediate allowance, such action is solicited.

Respectfully submitted,

ALBERT E. GESSLER

By Robert W. Byerly
His Attorney

New York City,
March 1st, 1937.

ADDRESS ONLY
THE COMMISSIONER OF PATENTS
WASHINGTON, D. C.

181

Serial No. 622,453

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

JUN 4 - 1937

Your APPLICATION for a patent for an IMPROVEMENT in

filed. has been examined and ALLOWED with 15 claims.

The final fee, THIRTY DOLLARS, WITH $1 ADDITIONAL FOR EACH CLAIM ALLOWED IN EXCESS OF 20, must be paid not later than SIX MONTHS from the date of this present notice of allowance. If the final fee be not paid within that period, the patent will be withheld, but the application may be renewed within one year after the date of the original notice with a renewal fee of $30 and $1 additional for each claim in excess of 20.

The office delivers patents upon the day of their date, on which date their term begins to run. The preparation of the patent for final signing and sealing will require about four weeks, and such work will not be begun until after payment of the necessary final fee.

When the final fee is paid, there should also be sent, DISTINCTLY AND PLAINLY WRITTEN, the name of the INVENTOR, TITLE OF THE INVENTION, AND SERIAL NUMBER AS ABOVE GIVEN, DATE OF ALLOWANCE (which is the date of this circular), DATE OF FILING, and, if assigned, the NAMES OF THE ASSIGNEES.

If it is desired to have the patent issue to an ASSIGNEE OR ASSIGNEES, an assignment containing a REQUEST to that effect, together with the FEE for recording the same, must be filed in this office on or before the date of payment of the final fee.

After issue of the patent, uncertified copies of the drawings and specifications may be purchased at the price of TEN CENTS EACH. The money should accompany the order. Postage stamps will not be received.

The final fee will NOT be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

NOTICE. WHEN THE NUMBER OF CLAIMS ALLOWED IS IN EXCESS OF 20, NO SUM LESS THAN $30 PLUS $1 ADDITIONAL FOR EACH CLAIM IN EXCESS OF TWENTY CAN BE ACCEPTED AS THE FINAL FEE.

Respectfully,

Commissioner of Patents.

622453

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IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

UNCERTIFIED CHECKS WILL NOT BE ACCEPTED.

RULE 78

JUN 16 1937

ORDERS No. 2695, 2901, 3311

E. 4 3 1

U. S. PATENT OFFICE
RECEIVED
JUN 16 1937
DIVISION 64

34
m.t.

64

Application of Albert E. Gessler,
Printing Ink,
Filed July 14, 1932,
Serial No. 622,453,
Allowed June 4, 1937.

Div. 64
Room 4708

U. S. PATENT OFFICE
JUN 15 1937
ISSUE DIV.

The Commissioner of Patents,

Washington, D. C.

Sir:

It is requested that the following amendment be entered under the provisions of Rule 78:

Claim 5, next to last line, after "temperatur cancel the comma

Claim 10, next to last line, after "temperatur cancel the comma

Claim 11, line 14, after "temperatures" cancel the comma

Claim 15, line 12, after "80°C." insert a comma -line 14, after "temperatures" cancel the comma

REMARKS

A review of the allowed claims indicates that some corrections in punctuation are necessary. It is requested that the above amendment be entered promptly in order that the patent may be issued without delay.

Respectfully submitted,

ALBERT E. GESSLER

By Robert W. Byerly
His Attorney

Entered under Order 3311

[redacted] Assistant
Acting Examiner.

New York City, June 11, 1937.

622453

Defendant's Exhibit E.

U. S. PATENT OFFICE
JUN 15 1937

STATE OF NEW YORK)
: ss:
COUNTY OF NEW YORK)

ALBERT E. GESSLER, whose application for Letters Patent for Improvements in Printing Ink, Serial No. 622,455, was filed in the United States Patent Office on July 14, 1932, being duly sworn, deposes and says that the subject matter of all the amendments heretofore filed was part of his invention, was invented before he filed his original application, above identified, for such invention, was not known or used before his invention, was not patented or described in a printed publication in any country more than two years before his application, was not patented in a foreign country on an application filed by himself or his legal representatives or assigns more than twelve months before his application, was not in public use or on sale in this country for more than two years before the date of his application, and has not been abandoned.

Albert E Gessler

Subscribed and sworn to before me
this 14th day of June , 1937.

Carl E Jans

Defendant's Exhibit E.

Div. 64. Room 4708 Paper No. 35

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WASHINGTON, D. C.

DEPARTMENT OF COMMERCE
UNITED STATES PATENT OFFICE
WASHINGTON

MAILED
JUN 16 1937

June 16, 1937

Robert W. Byerly,
225 Broadway,
New York, N. Y.

Applicant: Albert E. Gessler

Serial No. 622,453
Filed July 14, 1932
For Printing ink

The amendment proposed under Rule 78 has been entered under authority of Commissioner's Order No. 3311.

Acting Examiner

622453

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Defendant's Exhibit E.

JUN 17 37 241755 E ~Check — 30.00

FINAL FEE PAID TO THE COMMISSIONER OF PATENTS

(Be careful to give correct Serial No.)

Serial No. 622,453

INVENTOR:

Albert E. Geasler

PATENT TO BE ISSUED TO:

The International Printing Ink Corporation

NAME OF INVENTION, AS ALLOWED:

Printing Ink.

DATE OF PAYMENT:

June 17, 1937

FEE:

Thirty Dollars

DATE OF FILING:

July 14, 1932

DATE OF CIRCULAR OF ALLOWANCE:

June 4, 1937

The Commissioner of Patents will please apply the accompanying fee as indicated above.

Robert W. Byerly
Attorney.

SEND PATENT TO

Robert W. Byerly

225 Broadway

New York City

Final fees will not be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office, NOR WILL THEY BE APPLIED IN PENDING APPLICATIONS.

62243

Defendant's Exhibit E.

Patented July 13, 1937 2,087,190

UNITED STATES PATENT OFFICE

2,087,190

PRINTING INK

Albert E. Gessler, Ardsley-on-Hudson, N. Y., assignor, by mesne assignments, to The International Printing Ink Corporation, New York, N. Y., a corporation of Ohio

No Drawing. Application July 14, 1932, Serial No. 622,453. Renewed April 11, 1936

15 Claims. (Cl. 134—36)

The present invention relates to printing inks and has for an object the preparation of a novel type of printing ink, which possesses many advantages over the printing inks heretofore known and overcomes many of the disadvantages associated with the procedure which it has been necessary to use in order that such inks may be properly applied to produce a satisfactory print.

Heretofore, printing inks have in general been made by grinding pigments in oils or oil-varnishes, or both. Such oils or varnishes have absolute viscosities of 5 poises or above at 25° C., measured by the method applied to varnish viscosities (Gardner's Physical and Chemical Examination of Paints, Varnishes, etc., fifth edition 1930, pp. 246, 152, 153) and have been characterized by their relatively slow rate of drying depending upon polymerization, oxidation and/or absorption and, as a consequence, have presented great difficulty in printing processes by greatly delaying the speed of operation. This has not only necessitated the expense and maintenance of large and cumbersome auxiliary equipment and extra labor, but has also resulted in a dependency of the printing process upon the time required to obtain a complete drying.

In order to overcome these difficulties, it has been customary to incorporate in the inks varying amounts of driers which have the ability to accelerate the speed of the oxidation and/or polymerization of the oil varnishes. However, even with all possible acceleration, the drying of the prints takes many hours or even days, necessitating in addition to the great delay in time, extra labor to remove, to store, and to return to the machines the printed material and also in many cases a great waste of paper in the form of slip-sheets which must be rolled up or stacked between the prints in order to avoid offsetting, rubbing off, smudging or sticking together.

It has also been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers. As is well known, the cellulose solvents used in these lacquers are characterized by a high degree of volatility. Indeed, this characteristic is considered an advantage in lacquers, for in the ordinary use to which lacquers are put, a rapid drying or hardening is highly desirable. However, it is obvious that such rapid drying renders inks made on this principle unsuitable for printing from plates or rollers; for, while they may be applied to printing plates or rollers, they will quickly dry and harden thereon and they will have only the effect of yielding dry or half dry material to the printing form from which, therefore, no satisfactory impression can be made on the material to be printed.

I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided. Naturally, if the solvents are too slow in evaporating, the same difficulties, which occur in the case of ordinary oil varnish inks, are encountered. In this respect I have found that certain such high boiling solvents, very well adapted to dissolve cellulose compounds, have at room temperature such slow drying properties that, while they may be employed as solvents in this ink, and while an excellent impression may be transferred to the surface to be printed upon, the impression will nevertheless be so moist that it is likely to become blurred or smudged by rubbing after many hours or even days. This defect, however, may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit, at temperatures elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile.

By room temperatures, I mean the ordinary temperatures of a room in which technical work is carried on, which is generally accepted to be 20° to 25° C.

As above indicated, the present invention makes use of the characteristics of these solvents having high boiling points and high vapor pressures at elevated temperatures.

The referred to solutions, in contradistinction to lacquer solutions which require highly volatile solvents, are characterized by their very low rate of evaporation at temperatures approximating room temperature and by their ability to manifest a relatively high degree of volatility when subjected to temperatures higher than room temperature. The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure at room temperature, but yet further characterized by a rapid rise in their vapor pressure curves upon elevation of the temperature,—that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised. Among this peculiar class of solvents I have found as an example diethylene glycol monobutyl ether to be a solvent for nitro-

cellulose and many natural and artificial gums, very well adapted to the purposes of this invention. This solvent at room temperatures remains fluid and moist for a long period of time. When heated to about 100° C. or above, the rate of vaporization is greatly accelerated and, when used in the ink of this invention, produces a print which dries almost instantaneously when subjected to such a heat treatment.

The printing ink above briefly described may be further admixed with varying amounts of another and different class of oils or high boiling solvents possessing a very low vapor pressure over a wide range of temperatures, and characterised in that they are practically non-volatile if exposed to the heat necessary for the process. This admixture acts as a plasticiser and tends to prevent the brittle characteristic of a film consisting of nitrocellulose or gums alone.

The following specific example is illustrative of my invention as applied to the production of a yellow printing ink particularly. The ink may be made up as follows: 100 parts of chrome yellow, 35 parts of nitrocellulose (low viscosity), 55 parts of diethylene glycol monobutyl ether, 10 parts of dibutylphthalate, and 10 parts of blown castor oil.

The above composition may, for example, be prepared by grinding or otherwise dispersing the pigment in a solution of the nitrocellulose in diethylene glycol monobutyl ether. The two other ingredients may be introduced in such order as may be expedient. It will, of course, be recognised that the yellow pigment may be replaced by any suitable pigments or dyestuffs and/or mixtures thereof; that the nitrocellulose may be replaced by other cellulose compounds and/or by natural or synthetic resins. Moreover, the dibutylphthalate may be replaced by any other suitable agent, effective to prevent brittleness in the finished product. Also, the blown castor oil which has been included in the specific formula given may be replaced by other suitable materials. It may be desirable in some circumstances to omit the last two types of ingredients referred to in the illustrative formula, namely, those which have been added in order to offset extreme hardness and brittleness.

Diethylene glycol monobutyl ether is a practically odorless, saturated, aliphatic or open-chain chemical compound of carbon, hydrogen and oxygen.

The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures. These important properties of diethylene glycol monobutyl ether, the preponderant solvent constituting the major part of the liquid component of the ink in the example given, may, for comparative purposes, be indicated numerically in terms of its vapor pressure at different temperatures which, as determined by Brewer and Gardner in "Industrial and Engineering Chemistry", vol. 29, No. 1, p. 179, February, 1937, are as follows:

	Mm. of mercury
At 20° C.	0.02
At 100° C.	6.4
At 150° C.	about 60.0

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at ordinary room temperature. The vapor pressures of my preponderant solvent at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid, according to Brewer and Gardner, is 0.45 mm. at 100° C. and 1.4 mm. at 150° C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100° C. or 150° C.

With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly. Thus a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use. This method of printing is not claimed herein as it forms the subject matter of my co-pending application, Serial No. 15,944, filed April 12, 1935, which is in part a continuation of this application.

The novel ink and process described above are not only capable of utilisation in printing upon paper, but they are also adapted for use in making very satisfactory prints upon many other surfaces, such as for instance textiles or metallic surfaces, or the lacquered surfaces of Cellophane, or the like, where the production of a satisfactory print has heretofore been much restricted.

It is apparent that such an ink as has been described does not necessitate the admixture of driers, does not set or harden on the printing rollers or plates, but is yet capable of being dried very quickly when subjected to suitable temperatures after being printed, by the evaporation of the solvent from the thin layer of the print. The finished products are flexible prints in which the pigment is well protected against being rubbed off. They are not softened by moisture, grease, or chemical influences and possess practically no odor. The ink adheres securely to almost every type of surface.

What I claim is:

1. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

2. A printing ink which is substantially non-drying at ordinary temperatures and dries in-

Defendant's Exhibit E.

stantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and substantially 73% of the liquid component being a chemical compound containing carbon, hydrogen and oxygen, which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

3. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

4. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group cohsisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is an ether including one butyl radical and one diethylene glycol radical and having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol.

5. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is monobutyl ether of diethylene glycol.

6. A printing ink which is substantially non-drying at ordinary temperatures and which dries rapidly at 150° C. consisting of a coloring matter dispersed in a viscous fluid vehicle consisting of a liquid component the major portion of which is an organic solvent forming stable solutions with both nitrocellulose and resin having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and a solid component completely dissolved in the liquid component in an amount at least 47% of the amount of said liquid component, said solid component being a member of the group consisting of natural and synthetic resins and low viscosity cellulose esters.

7. A printing ink which is substantially non-drying at ordinary temperatures and which dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in a liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a cellulose compound, and the major part of the liquid component being a chemical compound which dissolves and forms a stable solution with the solid component and which has a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

8. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being an aliphatic chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

9. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a saturated chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

10. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and

Defendant's Exhibit E.

vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having an open-chain structure and a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

11. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid componeht being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and being a saturated compound forming a stable solution with the solid component.

12. A printing ink adapted for use on paper, comprising a coloring material in a vehicle containing essentially a binder for the coloring material and a solvent for the binder, said binder forming a stable solution in said solvent and being present in amount sufficient to give the ink the consistency of ordinary oil-varnish printing inks, and to protect the coloring material against being rubbed off when the ink is applied by an ordinary printing press, and substantially all of said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and developing such a marked increase in vapor pressure at elevated temperatures of 100° C. or above, to which printed paper can be subjected, that its vapor pressure at 150° C. approximates that of ethyl alcohol at ordinary temperatures and that it practically immediately evaporates from a thin film of ink at such temperatures, whereby said ink is stable on the printing press and capable of being immediately dried upon the application of heat following the printing operation.

13. A printing ink consisting of pigment dispersed in an organic viscous vehicle, consisting of a liquid component and a solid component—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and being dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, and to bind the pigment to paper when the ink is applied by an ordinary printing press, and substantially all of the liquid component having a vapor pressure at 20° C. which is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

14. A printing ink comprising a coloring material in a vehicle consisting of a solid component, composed principally of a binder of the group consisting of natural and synthetic resins and cellulose esters, and a liquid component, composed principally of volatilizable solvent for the binder, said binder being present in amount approximately one-half to two-thirds of said liquid component, by weight, and said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and having a vapor pressure at 150° C. equivalent to that of ethyl alcohol at room temperature.

15. A printing ink having a consistency suitable for ordinary printing and comprising a coloring material and a vehicle therefor including a liquid component and a solid component, said solid component being principally a binder for said coloring material, and said liquid component consisting essentially of a minor proportion of an agent adapted to prevent brittleness of the binder and a major proportion of a volatilizable solvent having vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and a vapor pressure at elevated temperature of 150° C. equivalent to that of ethyl alcohol at ordinary room temperature.

ALBERT E. GESSLER.

Defendant's Exhibit E.

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26.	Renewal petition	Dec 11-36
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29.	Final Rejection	JUN 20 1936
30.	Sup. Pet.	Sep 8. 2/36
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32.	Ltrs	Dec. 15/36.
33.	Amdt L	Mar 2-37
34.		
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U. S. PATENT OFFICE

Defendant's Exhibit E.

Plaintiff's Answers to Defendant's Interrogatories.

To the following interrogatories propounded by defendant under Rules 33 and 34 of the Rules of Civil Procedure, plaintiff makes verified answer by its duly qualified officer, as follows:

1. As to the "printing ink" described in Gessler patent No. 2,087,190, in suit, state as follows:

(a) Has the ink described in said patent been commercially sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee?

Answer: Yes.

(b) If the answer to Interrogatory 1-a is "Yes", has the ink so sold contained the diethylene glycol monobutyl named in the patent in suit as a solvent for solids of the group consisting of natural and synthetic resins and cellulose compounds?

Answer: Yes.

(c) If the answer to Interrogatory 1-b is "Yes", give (1) the approximate date when plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, first sold or offered for sale printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as such solvent, and (2) the name and address of the manufacturer or producer from whom the said diethylene glycol monobutyl ether was obtained.

Answer: (1) April, 1933.

(2) Carbide and Carbon Chemicals Corporation, New York, N. Y.

(d) If the answer to Interrogatory 1-b is "Yes", give the period of sale by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee,

of printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as such solvent.

Answer: From 1933 to date, but the sales since 1936 have been small.

(e) Has printing ink sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, and claimed by plaintiff to be covered by the patent in suit, contained a substitute solvent for solids of the group consisting of natural and synthetic resins and cellulose compounds, in lieu of the diethylene glycol monobutyl ether named in the patent in suit?

Answer: Yes. In some of the printing inks sold, equivalents have been substituted for the specific illustrative solvent named in the patent.

(f) If the answer to Interrogatory 1-e is "Yes", give the name of each such substitute solvent used in lieu of the diethylene glycol monobutyl ether named in the patent in suit, and (2) the name and address of the manufacturer or producer from whom each such solvent was obtained.

Answer: The equivalent solvents which have been used in place of diethylene glycol monobuty ether (butyl carbitol) are diethylene glycol monobutyl ether acetate (butyl carbitol acetate), purchased from Carbide and Carbon Chemicals Corporation, and high-boiling petroleum fractions, first purchased from American Mineral Spirits Co. and later from other oil companies.

(g) If the answer to Interrogatory 1-e is "Yes", give the date when plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, first sold printing ink containing a substitute solvent in lieu of the diethylene glycol monobutyl ether named in the patent in suit.

Answer: Ink containing butyl carbitol acetate as the solvent was first sold by plaintiff's predecessor in February of 1934.

Defendant's Exhibit F.

Ink containing a high-boiling petroleum fraction as the solvent was first sold by plaintiff in July of 1935.

(h) If the answer to Interrogatory 1-e is "Yes", give the period of sale by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, of printing ink containing a substitute solvent in lieu of the diethylene glycol monobutyl ether named in the patent in suit. If more than one such substitute solvent was used, give the answer to this Interrogatory 1-h as to each such substitute solvent, identifying the solvent by name in each case.

Answer: Inks containing butyl carbitol acetate: from 1934 to date.

Inks containing high-boiling petroleum fractions: from 1935 to date.

(i) If the answer to Interrogatory 1-e is "Yes", state the reason for the use in the printing ink sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, or its or their agent or licensee, of the substitute solvent named in answer to Interrogatory 1-f in lieu of the diethylene glycol monobutyl ether named in the patent in suit. If more than one such solvent was used, give the answer to this Interrogatory 1-i as to each such substitute solvent, identifying the solvent by name in each case.

Answer: Butyl carbitol acetate was used because it is an equivalent of diethylene glycol monobutyl ether (butyl carbitol) which has less effect on rollers composed of glue and glycerin which were used by some printers than does the specific illustrative solvent named in the patent in suit. High-boiling petroleum fractions equivalent to diethylene glycol monobutyl ether (butyl carbitol) were used because they are cheaper than the specific illustrative solvent named in the patent in suit.

(j) If the answer to Interrogatory 1-e is "Yes", state the vapor pressure of each substitute solvent named in the

answer to Interrogatory 1-f as used in lieu of diethylene glycol monobutyl ether named in the patent in suit at 20° C. and at 100° C. and at 150° C.

Answer: The vapor pressure of butyl carbitol acetate is about the same as that of diethylene glycol monobutyl ether (butyl carbitol) at 20° C. and is slightly less than that of diethylene glycol monobutyl ether (butyl carbitol) at the other two temperatures named.

The high-boiling petroleum fractions used have vapor pressures ranging from that of diethylene glycol monobutyl ether (butyl carbitol) to somewhat lower than that of diethylene glycol monobutyl ether (butyl carbitol) at the temperatures mentioned.

2. Submit to defendant's attorneys a one-pound sample of printing ink commercially manufactured for sale by plaintiff, its subsidiary, agent or licensee, which plaintiff claims to be covered by the patent in suit. If different inks are so commercially manufactured, i. e., in the respect that each contains a different solvent than another (regardless of color), submit one-pound samples of such different inks and identify each such sample with the said solvent it contains. Submit also a sample of the solvent contained in each ink sample and state the classes of ingredients in said inks with proportions.

Answer: Plaintiff has submitted to defendant's attorney three one-pound samples of its commercial printing inks containing different solvents and has identified these samples as containing, respectively, butyl carbitol, butyl carbitol acetate and a high-boiling petroleum fraction. Plaintiff has also furnished to defendant's attorney samples of the three solvents contained in the three ink samples. The composition of the ink samples submitted is as follows:

Defendant's Exhibit F.

Ink No. 1

Pigments	59.3%	
Vehicle	40.7%	
	100. %	
Vehicle		
Solvent (Butyl Carbitol)		75.5%
Resin (Nitrocellulose)		24.5%
		100. %

Ink No. 2

Pigments	42.5%	
Vehicle	57.5%	
	100. %	
Vehicle		
Solvent (Butyl Carbitol Acetate)		49.9%
Resins		47.5%
Other Ingredients:		
Solid		0.7%
Liquid		1.9%
		100. %

Ink No. 3

Pigments	29.3%	
Vehicle	70.7%	
	100. %	
Vehicle		
Solvent (High-boiling petroleum fraction)		42.2%
Resins		28.0%
Other ingredients:		
Solid		1.8%
Liquid		28.0%
		100. %

Defendant's Exhibit F.

The "other ingredients" referred to above include wax, drying oil, wetting agents, etc.

3. Give the date when and place (including name and address of establishment) where printing ink that plaintiff claims to be covered by the patent in suit was first used in a printing press for printing on (a) paper, (b) textiles, (c) lacquered surfaces of cellophane, as stated in the patent in suit.

Answer: The ink described in the patent in suit was first used in a printing press for printing on paper at the plant of the Paterson Parchment Paper Company in Passaic, New Jersey, on May 10, 1932.

In so far as plaintiff is informed, the ink has not been used commercially for printing on textiles or "cellophane".

4. If printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as a solvent has been sold since 1936, by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, state (a) the names and addresses of the purchasers thereof, and (b) whether or not in use such ink was dried or set by heat applied to the paper after printing by each of said purchasers.

Answer: (a) Kalamazoo Vegetable Parchment Company, Parchment, Michigan.

(b) Yes, it was so dried.

5. State whether plaintiff, its predecessor, subsidiary, licensee, or agent has given notice to the public of the patent in suit by marking with the patent number under R. S. Section 4900 any inks marketed by it.

Answer: No.

INTERCHEMICAL CORPORATION

By DU VAL R. GOLDTHWAITE

Defendant's Exhibit F:

STATE OF NEW YORK }
COUNTY OF NEW YORK } ss.:

DU VAL R. GOLDTHWAITE, being duly sworn, dep
says:

That he is Chairman of the Board of Dir
Interchemical Corporation, a corporate plaintiff
that he subscribed the foregoing answers to def
interrogatories on behalf of said corporate plain
he has read the answers and knows the contents
and that the same are true and accurate.

DU VAL R. GOLDT

Sworn to and subscribed before me }
this 10th day of December, 1942. }

FANNIE D. SMUL
Notary Public
Notary Public, Queens County
Queens County Clerk's number 3969
Queens County Register's number 4401
Certificate filed in
New York County Clerk's number 2184
New York County Register's number 4-S-1207
Commission expires March 30, 1944

(SEAL)

Defendant's Exhibit G.

Book of Patents and Publications.

(Opposite ☞)

Defendant's Exhibit E.

Patented July 13, 1937 2,087,190

UNITED STATES PATENT OFFICE

2,087,190

PRINTING INK

Albert E. Gessler, Ardsley-on-Hudson, N. Y., assignor, by mesne assignments, to The International Printing Ink Corporation, New York, N. Y., a corporation of Ohio

No Drawing. Application July 14, 1932, Serial No. 622,453. Renewed April 11, 1936

15 Claims. (Cl. 134—36)

The present invention relates to printing inks and has for an object the preparation of a novel type of printing ink, which possesses many advantages over the printing inks heretofore known and overcomes many of the disadvantages associated with the procedure which it has been necessary to use in order that such inks may be properly applied to produce a satisfactory print.

Heretofore, printing inks have in general been made by grinding pigments in oils or oil-varnishes, or both. Such oils or varnishes have absolute viscosities of 5 poises or above at 25° C., measured by the method applied to varnish viscosities (Gardner's Physical and Chemical Examination of Paints, Varnishes, etc., fifth edition 1930, pp. 240, 152, 153) and have been characterized by their relatively slow rate of drying depending upon polymerization, oxidation and/or absorption and, as a consequence, have presented great difficulty in printing processes by greatly delaying the speed of operation. This has not only necessitated the expense and maintenance of large and cumbersome auxiliary equipment and extra labor, but has also resulted in a dependency of the printing process upon the time required to obtain a complete drying.

In order to overcome these difficulties, it has been customary to incorporate in the inks varying amounts of driers which have the ability to accelerate the speed of the oxidation and/or polymerization of the oil varnishes. However, even with all possible acceleration, the drying of the prints takes many hours or even days, necessitating in addition to the great delay in time, extra labor to remove, to store, and to return to the machines the printed material and also in many cases a great waste of paper in the form of slip-sheets which must be rolled up or stacked between the prints in order to avoid offsetting, rubbing off, smudging or sticking together.

It has also been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers. As is well known, the cellulose solvents used in these lacquers are characterized by a high degree of volatility. Indeed this characteristic is considered an advantage in lacquers, for in the ordinary use to which lacquers are put, a rapid drying or hardening is highly desirable. However, it is obvious that such rapid drying renders inks made on this principle unsuitable for printing from plates or rollers; for, while they may be applied to printing plates or rollers, they will quickly dry and harden thereon and they will have only the effect of yielding dry or half dry material to the printing form from which, therefore, no satisfactory impression can be made on the material to be printed.

I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided. Naturally, if the solvents are too slow in evaporating, the same difficulties, which occur in the case of ordinary oil varnish inks, are encountered. In this respect I have found that certain such high boiling solvents, very well adapted to dissolve cellulose compounds, have at room temperature such slow drying properties that, while they may be employed as solvents in this ink and while an excellent impression may be transferred to the surface to be printed upon, the impression will nevertheless be so moist that it is likely to become blurred or smudged by rubbing after many hours or even days. This defect, however, may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit at temperatures elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile.

By room temperatures, I mean the ordinary temperatures of a room in which technical work is carried on, which is generally accepted to be 20° to 25° C.

As above indicated, the present invention makes use of the characteristics of these solvents having high boiling points and high vapor pressures at elevated temperatures.

The referred to solutions, in contradistinction to lacquer solutions, which require highly volatile solvents, are characterized by their very low rate of evaporation at temperatures approximating room temperature and by their ability to manifest a relatively high degree of volatility when subjected to temperatures higher than room temperature. The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure at room temperature, but yet further characterized by a rapid rise in their vapor pressure curves upon elevation of the temperature—that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised. Among this peculiar class of solvents I have found as an example diethylene glycol monobutyl ether to be a solvent for nitro-

Defendant's Exhibit E.

cellulose and many natural and artificial gums, very well adapted to the purposes of this invention. This solvent at room temperatures remains fluid and moist for a long period of time. When heated to about 100° C. or above, the rate of vaporization is greatly accelerated and, when used in the ink of this invention, produces a print which dries almost instantaneously when subjected to such a heat treatment.

The printing ink above briefly described may be further admixed with varying amounts of another and different class of oils or high boiling solvents possessing a very low vapor pressure over a wide range of temperatures, and characterised in that they are practically non-volatile if exposed to the heat necessary for the process. This admixture acts as a plasticiser and tends to prevent the brittle characteristic of a film consisting of nitrocellulose or gums alone.

The following specific example is illustrative of my invention as applied to the production of a yellow printing ink particularly. The ink may be made up as follows: 100 parts of chrome yellow, 35 parts of nitrocellulose (low viscosity), 55 parts of diethylene glycol monobutyl ether, 10 parts of dibutylphthalate, and 10 parts of blown castor oil.

The above composition may, for example, be prepared by grinding or otherwise dispersing the pigment in a solution of the nitrocellulose in diethylene glycol monobutyl ether. The two other ingredients may be introduced in such order as may be expedient. It will, of course, be recognised that the yellow pigment may be replaced by any suitable pigments or dyestuffs and/or mixtures thereof; that the nitrocellulose may be replaced by other cellulose compounds and/or by natural or synthetic resins. Moreover, the dibutylphthalate may be replaced by any other suitable agent, effective to prevent brittleness in the finished product. Also, the blown castor oil which has been included in the specific formula given may be replaced by other suitable materials. It may be desirable in some circumstances to omit the last two types of ingredients referred to in the illustrative formula, namely, those which have been added in order to offset extreme hardness and brittleness.

Diethylene glycol monobutyl ether is a practically odorless, saturated, aliphatic or open-chain chemical compound of carbon, hydrogen and oxygen.

The diethylene glycol monobutyl ether may be replaced by other solvents or solvent mixtures possessing a similar low rate of evaporation at ordinary temperatures and a marked acceleration of volatility at raised temperatures. These important properties of diethylene glycol monobutyl ether, the preponderant solvent constituting the major part of the liquid component of the ink in the example given, may, for comparative purposes, be indicated numerically in terms of its vapor pressure at different temperatures which, as determined by Brewer and Gardner in "Industrial and Engineering Chemistry", vol. 29, No. 2, p. 179, February, 1937, are as follows:

	Mm. of mercury
At 20° C.	0.02
At 100° C.	6.4
At 150° C.	about 60.0

These vapor pressures indicate that, at elevated temperatures, this solvent becomes a highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol which has a vapor pressure of about 40 mm. at ordinary room temperature. The vapor pressures of my preponderant solvent at elevated temperatures contrast sharply with those of the high boiling solvents ordinarily termed "plasticizers" such as dibutyl phthalate, a minor proportion of which is used in the specific formula given. The vapor pressure of this liquid, according to Brewer and Gardner, is 0.45 mm. at 100° C. and 1.4 mm. at 150° C. The vapor pressures of diethylene glycol monobutyl ether indicate that this solvent will evaporate almost instantaneously at elevated temperatures like ethyl alcohol at ordinary temperatures, while such high boiling solvents or plasticizers as dibutyl phthalate evaporate only slowly when heated to temperatures of 100° C. or 150° C.

With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly. Thus a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use. This method of printing is not claimed herein as it forms the subject matter of my co-pending application, Serial No. 15,944, filed April 12, 1935, which is in part a continuation of this application.

The novel ink and process described above are not only capable of utilization in printing upon paper, but they are also adapted for use in making very satisfactory prints upon many other surfaces, such as for instance textiles or metallic surfaces, or the lacquered surfaces of Cellophane, or the like, where the production of a satisfactory print has heretofore been much restricted.

It is apparent that such an ink as has been described does not necessitate the admixture of driers, does not set or harden on the printing rollers or plates, but is yet capable of being dried very quickly when subjected to suitable temperatures after being printed, by the evaporation of the solvent from the thin layer of the print. The finished products are flexible prints in which the pigment is well protected against being rubbed off. They are not softened by moisture, grease, or chemical influences and possess practically no odor. The ink adheres securely to almost every type of surface.

What I claim is:

1. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

2. A printing ink which is substantially non-drying at ordinary temperatures and dries in-

Defendant's Exhibit E.

stantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and substantially 73% of the liquid component being a chemical compound containing carbon, hydrogen and oxygen, which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and, at 150° C., approximates that of ethyl alcohol at ordinary temperatures.

3. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

4. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C. consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is an ether including one butyl radical and one diethylene glycol radical and having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol.

5. A printing ink which is substantially non-drying at ordinary temperatures and dries rapidly at 150° C., consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component—being a member of the group consisting of natural and synthetic resins and cellulose compounds—dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, in which the major part of the liquid component is monobutyl ether of diethylene glycol.

6. A printing ink which is substantially non-drying at ordinary temperatures and which dries rapidly at 150° C. consisting of a coloring matter dispersed in a viscous fluid vehicle consisting of a liquid component the major portion of which is an organic solvent forming stable solutions with both nitrocellulose and resin having a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and at 150° C. approximates that of ethyl alcohol, and a solid component completely dissolved in the liquid component in an amount at least 47% of the amount of said liquid component, said solid component being a member of the group consisting of natural and synthetic resins and low viscosity cellulose esters.

7. A printing ink which is substantially non-drying at ordinary temperatures and which dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in a liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a cellulose compound, and the major part of the liquid component being a chemical compound which dissolves and forms a stable solution with the solid component and which has a vapor pressure which at 20° C. is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C. and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

8. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being an aliphatic chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C. and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

9. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and the major part of the liquid component being a saturated chemical compound containing carbon, hydrogen and oxygen which dissolves and forms a stable solution with the solid component and which has a vapor pressure which, at 20° C., is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C. and at 150° C. approximates that of ethyl alcohol at ordinary temperatures.

10. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and

vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having an open-chain structure and a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

11. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and being a saturated compound forming a stable solution with the solid component.

12. A printing ink adapted for use on paper, comprising a coloring material in a vehicle containing essentially a binder for the coloring material and a solvent for the binder, said binder forming a stable solution in said solvent and being present in amount sufficient to give the ink the consistency of ordinary oil-varnish printing inks, and to protect the coloring material against being rubbed off when the ink is applied by an ordinary printing press, and substantially all of said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and developing such a marked increase in vapor pressure at elevated temperatures of 100° C. or above, to which printed paper can be subjected, that its vapor pressure at 150° C. approximates that of ethyl alcohol at ordinary temperatures and that it practically immediately evaporates from a thin film of ink at such temperatures, whereby said ink is stable on the printing press and capable of being immediately dried upon the application of heat following the printing operation.

13. A printing ink consisting of pigment dispersed in an organic viscous vehicle, consisting of a liquid component and a solid component—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, and being dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink, and to bind the pigment to paper when the ink is applied by an ordinary printing press, and substantially all of the liquid component having a vapor pressure at 20° C. which is as low as the vapor pressure of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component.

14. A printing ink comprising a coloring material in a vehicle consisting of a solid component, composed principally of a binder of the group consisting of natural and synthetic resins and cellulose esters, and a liquid component, composed principally of volatilizable solvent for the binder, said binder being present in amount approximately one-half to two-thirds of said liquid component, by weight, and said solvent having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and having a vapor pressure at 150° C. equivalent to that of ethyl alcohol at room temperature.

15. A printing ink having a consistency suitable for ordinary printing and comprising a coloring material and a vehicle therefor including a liquid component and a solid component, said solid component being principally a binder for said coloring material, and said liquid component consisting essentially of a minor proportion of an agent adapted to prevent brittleness of the binder and a major proportion of a volatilizable solvent having vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at room temperatures of 20° C., and a vapor pressure at elevated temperature of 150° C. equivalent to that of ethyl alcohol at ordinary room temperature.

ALBERT E. GESSLER.

Defendant's Exhibit E.

1932

CONTENTS.

	Application	papers.	
1.			
2.			
3.		SEP 13 1933	
4.		JUN 4 1934	
5.			
6.		JUN 5 1934	
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8.		Nov. 27/34	
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26.	Renewal petition	
27.	Amdt J	
28.	Amdt K	
29.	Final Rejection	JUN 28 1936
30.	Sup. Pet.	Sep 8. 2/36
31.	Letter	
32.	Affs	Dec. 15/36.
33.	Amdt L	Mar 2-37
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Defendant's Exhibit F.

Plaintiff's Answers to Defendant's Interrogatories.

To the following interrogatories propounded by defendant under Rules 33 and 34 of the Rules of Civil Procedure, plaintiff makes verified answer by its duly qualified officer, as follows:

1. As to the "printing ink" described in Gessler patent No. 2,087,190, in suit, state as follows:

(a) Has the ink described in said patent been commercially sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee?

Answer: Yes.

(b) If the answer to Interrogatory 1-a is "Yes", has the ink so sold contained the diethylene glycol monobutyl named in the patent in suit as a solvent for solids of the group consisting of natural and synthetic resins and cellulose compounds?

Answer: Yes.

(c) If the answer to Interrogatory 1-b is "Yes", give (1) the approximate date when plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, first sold or offered for sale printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as such solvent, and (2) the name and address of the manufacturer or producer from whom the said diethylene glycol monobutyl ether was obtained.

Answer: (1) April, 1933.

(2) Carbide and Carbon Chemicals Corporation, New York, N. Y.

(d) If the answer to Interrogatory 1-b is "Yes", give the period of sale by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee,

of printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as such solvent?

Answer: From 1933 to date, but the sales since 1936 have been small.

(e) Has printing ink sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, and claimed by plaintiff to be covered by the patent in suit, contained a substitute solvent for solids of the group consisting of natural and synthetic resins and cellulose compounds, in lieu of the diethylene glycol monobutyl ether named in the patent in suit?

Answer: Yes. In some of the printing inks sold, equivalents have been substituted for the specific illustrative solvent named in the patent.

(f) If the answer to Interrogatory 1-e is "Yes", give the name of each such substitute solvent used in lieu of the diethylene glycol monobutyl ether named in the patent in suit, and (2) the name and address of the manufacturer or producer from whom each such solvent was obtained.

Answer: The equivalent solvents which have been used in place of diethylene glycol monobuty ether (butyl carbitol) are diethylene glycol monobutyl ether acetate (butyl carbitol acetate), purchased from Carbide and Carbon Chemicals Corporation, and high-boiling petroleum fractions, first purchased from American Mineral Spirits Co. and later from other oil companies.

(g) If the answer to Interrogatory 1-e is "Yes", give the date when plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, first sold printing ink containing a substitute solvent in lieu of the diethylene glycol monobutyl ether named in the patent in suit.

Answer: Ink containing butyl carbitol acetate as the solvent was first sold by plaintiff's predecessor in February of 1934.

Defendant's Exhibit F.

Ink containing a high-boiling petroleum fraction as the solvent was first sold by plaintiff in July of 1935.

(h) If the answer to Interrogatory 1-e is "Yes", give the period of sale by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, of printing ink containing a substitute solvent in lieu of the diethylene glycol monobutyl ether named in the patent in suit. If more than one such substitute solvent was used, give the answer to this Interrogatory 1-h as to each such substitute solvent, identifying the solvent by name in each case.

Answer: Inks containing butyl carbitol acetate: from 1934 to date.

Inks containing high-boiling petroleum fractions: from 1935 to date.

(i) If the answer to Interrogatory 1-e is "Yes", state the reason for the use in the printing ink sold by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, or its or their agent or licensee, of the substitute solvent named in answer to Interrogatory 1-f in lieu of the diethylene glycol monobutyl ether named in the patent in suit. If more than one such solvent was used, give the answer to this Interrogatory 1-i as to each such substitute solvent, identifying the solvent by name in each case.

Answer: Butyl carbitol acetate was used because it is an equivalent of diethylene glycol monobutyl ether (butyl carbitol) which has less effect on rollers composed of glue and glycerin which were used by some printers than does the specific illustrative solvent named in the patent in suit. High-boiling petroleum fractions equivalent to diethylene glycol monobutyl ether (butyl carbitol) were used because they are cheaper than the specific illustrative solvent named in the patent in suit.

(j) If the answer to Interrogatory 1-e is "Yes", state the vapor pressure of each substitute solvent named in the

answer to Interrogatory 1-f as used in lieu of diethylene glycol monobutyl ether named in the patent in suit at 20° C. and at 100° C. and at 150° C.

Answer: The vapor pressure of butyl carbitol acetate is about the same as that of diethylene glycol monobutyl ether (butyl carbitol) at 20° C. and is slightly less than that of diethylene glycol monobutyl ether (butyl carbitol) at the other two temperatures named.

The high-boiling petroleum fractions used have vapor pressures ranging from that of diethylene glycol monobutyl ether (butyl carbitol) to somewhat lower than that of diethylene glycol monobutyl ether (butyl carbitol) at the temperatures mentioned.

2. Submit to defendant's attorneys a one-pound sample of printing ink commercially manufactured for sale by plaintiff, its subsidiary, agent or licensee, which plaintiff claims to be covered by the patent in suit. If different inks are so commercially manufactured, i. e., in the respect that each contains a different solvent than another (regardless of color), submit one-pound samples of such different inks and identify each such sample with the said solvent it contains. Submit also a sample of the solvent contained in each ink sample and state the classes of ingredients in said inks with proportions.

Answer: Plaintiff has submitted to defendant's attorney three one-pound samples of its commercial printing inks containing different solvents and has identified these samples as containing, respectively, butyl carbitol, butyl carbitol acetate and a high-boiling petroleum fraction. Plaintiff has also furnished to defendant's attorney samples of the three solvents contained in the three ink samples. The composition of the ink samples submitted is as follows:

Defendant's Exhibit F.

Ink No. 1

Pigments	59.3%	
Vehicle	40.7%	
	100. %	
Vehicle		
Solvent (Butyl Carbitol)		75.5%
Resin (Nitrocellulose)		24.5%
		100. %

Ink No. 2

Pigments	42.5%	
Vehicle	57.5%	
	100. %	
Vehicle		
Solvent (Butyl Carbitol Acetate)		49.9%
Resins		47.5%
Other Ingredients:		
Solid		0.7%
Liquid		1.9%
		100. %

Ink No. 3

Pigments	29.3%	
Vehicle	70.7%	
	100. %	
Vehicle		
Solvent (High-boiling petroleum fraction)		42.2%
Resins		28.0%
Other ingredients:		
Solid		1.8%
Liquid		28.0%
		100. %

Defendant's Exhibit F.

The "other ingredients" referred to above include wax, drying oil, wetting agents, etc.

3. Give the date when and place (including name and address of establishment) where printing ink that plaintiff claims to be covered by the patent in suit was first used in a printing press for printing on (a) paper, (b) textiles, (c) lacquered surfaces of cellophane, as stated in the patent in suit.

Answer: The ink described in the patent in suit was first used in a printing press for printing on paper at the plant of the Paterson Parchment Paper Company in Passaic, New Jersey, on May 10, 1932.

In so far as plaintiff is informed, the ink has not been used commercially for printing on textiles or "cellophane".

4. If printing ink containing the diethylene glycol monobutyl ether named in the patent in suit as a solvent has been sold since 1936, by plaintiff, its predecessor, its subsidiary, predecessor of its subsidiary, its or their agent or licensee, state (a) the names and addresses of the purchasers thereof, and (b) whether or not in use such ink was dried or set by heat applied to the paper after printing by each of said purchasers.

Answer: (a) Kalamazoo Vegetable Parchment Company, Parchment, Michigan.

(b) Yes, it was so dried.

5. State whether plaintiff, its predecessor, subsidiary, licensee, or agent has given notice to the public of the patent in suit by marking with the patent number under R. S. Section 4900 any inks marketed by it.

Answer: No.

INTERCHEMICAL CORPORATION

By DU VAL R. GOLDTHWAITE

Defendant's Exhibit F

STATE OF NEW YORK }
COUNTY OF NEW YORK } ss.:

DU VAL R. GOLDTHWAITE, being duly sworn, deposes and says:

That he is Chairman of the Board of Directors of Interchemical Corporation, a corporate plaintiff herein; that he subscribed the foregoing answers to defendant's interrogatories on behalf of said corporate plaintiff; that he has read the answers and knows the contents thereof, and that the same are true and accurate.

DU VAL R. GOLDTHWAITE

Sworn to and subscribed before me }
this 10th day of December, 1942. }

FANNIE D. SMUL
Notary Public
Notary Public, Queens County
Queens County Clerk's number 3969
Queens County Register's number 4401
Certificate filed in
New York County Clerk's number 2184
New York County Register's number 4-S-1207
Commission expires March 30, 1944

(SEAL)

Defendant's Exhibit G.

Book of Patents and Publications.

(Opposite ☞)

UNITED STATES PATENT OFFICE.

MARSHALL C. LEFFERTS, OF NEW YORK, N. Y., AND JOHN H. STEVENS, OF NEWARK, NEW JERSEY.

INK.

SPECIFICATION forming part of Letters Patent No. 380,654, dated April 3, 1888.

Application filed December 6, 1886. Serial No. 220,921. (No specimens.)

To all whom it may concern:

Be it known that we, MARSHALL C. LEFFERTS, of the city of New York, in the county of New York and State of New York, and JOHN H. STEVENS, of the city of Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Inks, of which the following is a specification.

Our invention relates to an improved ink for use in the process of printing upon celluloid and other solid pyroxyline compounds. As this material is of a hard, solid, and nonporous nature, ordinary printing-ink is unfit for this purpose, it not being absorbed as in the case of paper and other material, and when applied to the surface of pyroxyline compounds may be easily defaced or entirely rubbed off.

Heretofore inks that have been used for printing or decorating the surface of celluloid or analogous compounds have contained an ingredient which acted as a solvent of both the pyroxyline and the coloring material. It has been the practice to employ analine colors which have been dissolved in a liquid or mixture which is a solvent of both the analine colors and the pyroxyline compound, and such mixture has been applied to the surface by a brush or pencil or with type. One objection to this ink is that that portion of the color which remains on the surface of the material on becoming dried is easily and readily rubbed or wiped from the surface, leaving an imperfect and indistinct impression.

The object of our invention is to overcome this objection, and, further, to produce an ink in which an insoluble pigment in powdered form may be used, as in ordinary printing-inks; and with these ends in view our invention consists, first, in the employment of a gum in an ink for use in printing upon pyroxyline compounds; secondly, in the use of an insoluble pigment and a solvent of pyroxyline in an ink for use in printing upon pyroxyline compounds; and, thirdly, in an ink containing an insoluble pigment, a solvent of pyroxyline, and a gum or binding agent for holding the particles of pigments together, which ink when applied to a surface of celluloid or other pyroxyline compound effectually attaches itself in and to the surface.

The ingredients entering into the compound are: First, a solvent or a mixture which is a solvent of pyroxyline; second, a pigment or coloring material in powdered form; third, a gum, gums, or binding agent for holding the particles of pigment together.

In describing our invention, we will first state the functions or action of the ingredients entering into the compound, and under each respective head name some of the substances which may be used.

Pigment or coloring matter.—In the first place it is necessary that there shall be a coloring-matter, the function of which is similar to that used in ordinary printing-inks—viz., to impart to the surface printed upon the desired color or tint. For this purpose any suitable pigment may be used, such as is commonly employed in compounding ordinary printing-inks, and which is insoluble in the liquid menstrua employed.

Binder.—The function or office of the binder is to hold, bind, or retain the fine particles of pigment or coloring material together in order that the particles of pigment which are fastened in the surface of the material will not separate from those remaining on the surface, and thus prevent them from being rubbed off. To effect this purpose and produce the best results, the substance used should be soluble in the menstrua or solvent employed that is capable of being dissolved in or combined therewith by the aid of heat or otherwise. The use of this binder is also a great improvement in inks in which the coloring material is soluble. Any gum—such as shellac, rosin, mastic, copal, (preferably the oxidized portion thereof, as copal or kauri dust,) &c., or such gums combined with other material, as pyroxyline—may be used. The kind and proportions of the binding agent used will depend somewhat upon the character of the printing to be done—as, for instance, in inks for use in plate-printing it is preferable to employ gums which will allow the ink to "wipe" smoothly from the polished surface of the plate, as shellac, and in inks to be used for type-printing a more-

adhesive gum, as mastic, rosin, or copal, and in greater proportions, is preferable. We have found that by using a portion of shellac and pyroxyline in inks for use in the former character of printing better results are obtained than by the use of shellac alone. To any one or more of these substances may be added, if desired, camphor, which unites with the binder to form a solid agent for the color, and which from its nature also assists in the solvent action. Castor-oil may also be added to assist in the operation of the gum or gums used as a binder, which further serves to render the ink smooth.

Solvents.—The office or function of the solvent is to penetrate the material and serve as a vehicle for carrying the color and fastening it on or to the surface thereof. With regard to the liquid menstrua which might be used, it is desirable that they be of a low volatility, and either in themselves solvents of the pyroxyline compound or of such a nature that when combined with the other ingredients a mixture which operates as a solvent will be formed—as, for instance, oil of cassia may be used, which in itself is a solvent of both pyroxyline and pyroxyline compounds, or oil of sassafras may be used, which, though in itself not a solvent of pyroxyline, and only under certain conditions a solvent of the compound, yet when combined with the camphor used as an auxiliary binder renders the mixture an effective solvent. By preference we use such substances as oil of cassia, oil of sassafras, nitro-benzole, oil of pennyroyal, oil of fennel seed, oil of cherry-laurel, heavy oil of cinnamon, and oil of hyssop. Some of the lighter solvents may also be used in connection with the above, such as fusel-oil, wood-spirits, grain-alcohol, &c., which not only act as solvents, but also serve to prevent the ink from becoming too thick or adhesive. The tendency of alcohol is also to cut the gum or gums and prevent its settling when slow in dissolving. In selecting the ingredient or ingredients for this purpose care should be taken to employ those substances not likely to cause separation of the ingredients in the compounds. It sometimes happens in mixing an ink for use in plate-printing that the materials have such a tendency after being compounded. In such case the ink may usually be restored to its normal condition by regrinding and at the same time adding a little fusel-oil. Oil of cloves may be employed in an ink for use in plate-printing, and combines readily with the other ingredients, but after having stood a length of time exhibits this tendency to separate. When such substance, or other substances exhibiting a like tendency, is employed, castor-oil and wood-spirits should be omitted and the fusel-oil used in greater proportion. As above stated, it is desirable that the substances used for this office be of a slow drying nature by virtue of which property they will keep the ink in a moist condition for a long time, producing an action somewhat similar to that of linseed-oil used in the preparation of common engraving or printing ink.

Our improved ink, produced as above described, possesses many advantages over those heretofore compounded for use on pyroxyline material, its chief and most important characteristic being that that portion which remains on the surface of the material is capable of being so hardened or baked as to resist a great amount of rubbing without being defaced. In using this ink for printing from engraved plates we prefer to employ heat and pressure, which are applied to the plate and material, the effect being that the ink partially penetrates the surface of the material, while that portion remaining on the surface is baked or hardened, so as to form a hard durable surface. This property of the ink distinguishes it from all other mixtures or inks of which we know.

The proportionate quantities of the ingredients used in compounding the ink will depend somewhat upon the nature or character of the printing to be done and upon whether the ink is to be used in plate printing, type or surface printing.

For plate printing the following proportions may be used with good results:

Pigment.—Any suitable pigment as used in ordinary printing or engraving inks, the amount and color, respectively, depending upon the consistency and color desired.

Gums or binder.—By weight, shellac, four parts; pyroxyline, one-fifth part; camphor, eight parts; castor-oil, two parts.

Solvents.—By weight, oil of cassia, ten parts; fusel-oil, two parts; wood-spirits, two parts.

Heretofore in attempting to color or decorate the surface of pyroxyline compounds inks or dyes have been employed which necessitate the drying of the surface after the application of the color. By means of our improved ink, when used in connection with heat and pressure, as above stated, a hard and permanent impression is produced, and the printed sheets or articles may be piled together immediately after they are taken from the press.

In compounding the ink for use in type-printing, it is especially desirable that the mixture be of a slow-drying nature, as the ink is spread over a large surface, and the entire quantity applied to the type used up, the large surface upon which the ink is spread allowing of permitting of a rapid evaporation of the volatile ingredients, whereas in inks for use in plate printing, though desirable to use slow-drying substances, yet it is not so essential, for the reason that a fresh supply of ink is applied to the plate at each impression taken therefrom, the excess of ink, as is well understood, being wiped off at each operation. It is also desirable that the ink for use in type-printing be of a more adhesive nature to prevent spreading. For this character of printing, the following ingredients may be used with good results:

Pigment.—Any suitable pigment, as used in

ordinary printing or engraving inks, the amount and color, respectively, depending upon the consistency and color desired.

Gums or binder.—By weight, gum mastic or rosin, two parts; camphor, one part.

Solvent.—Oil of cassia, one part.

After the printed article upon which the ink has been used is delivered from the press little or no drying will be found necessary, as the ink is of such nature as to rapidly harden on the material employed.

The compounding of our improved ink is best effected by combining the heavy solvents and binding agents at an elevated temperature, after which the lighter solvents may be added, and the mixture then ground with the pigment in the usual manner for making printing-inks.

The nature and functions of the different ingredients being understood, many equivalent substances or agents which produce similar effects upon pyroxyline compounds and equivalent substances to be used for those referred to as binding agents will suggest themselves to persons skilled in the art, and which may be used with good results, and although we have mentioned only the preferred ingredients we do not intend to limit our invention to those we have specified.

We intend to use any and all known substances or agents which it is possible to use in lieu of those hereinbefore specifically mentioned. In specifying the pigments and solvents and gums, simple and compound, and in describing their use in certain quantities and proportions we have not intended to limit our claim. On the contrary, we are fully aware that other substances and other mixtures and other quantities and proportions than those hereinbefore mentioned may be used with satisfactory results; and we intend that our claims, hereinafter formulated, shall cover and include, broadly, an ink for use in printing upon pyroxyline compounds, in which there shall be used in efficient proportions an insoluble pigment or coloring material, a gum or combination of gums for holding the particles of pigment together, and a solvent or mixture which is a solvent of the pyroxyline compound upon which the ink is to be applied. It is obvious that numerous ingredients may be added—such as camphor, castor-oil, fusel-oil, and other materials—the natures of which are understood, to add to the efficiency of the ink without impairing its value by reason of the presence of the three important constituents of which it is chiefly composed. By the terms "insoluble pigment," as used in our claims, we mean any substance or compound or combination of substances which is insoluble in the menstrua employed. By the term "gum" we mean any gum or combination of gums or substance containing a gum or gums in efficient proportions, and by the term "solvent" we mean any substance or compound or combination of substances which, when the ink is applied to the surface of the pyroxyline compound, will act as a solvent thereof; and by the term "volatile oil," as used in our claims, we mean an essential oil of the nature of those hereinbefore described.

We are aware that certain solvents of nitrocellulose have been employed in the manufacture of celluloid, such solvents being enumerated in several patents granted to one of us—to wit, to John H. Stevens, of Newark, New Jersey, and dated December 19, 1882—but we are not aware that an ink has ever before been made in which a solvent of pyroxyline has been used as a vehicle for the coloring material in a powdered form, or that an ink has ever before been compounded for use upon pyroxyline materials containing the pigment or coloring-matter in a powdered form, or that any ink for this purpose has ever before been compounded in which a binder has been used as an element; and therefore

What we claim as our invention, and desire to secure by Letters Patent, is—

1. An ink for use in printing upon celluloid or other pyroxyline compounds, consisting essentially, of insoluble pigment in powdered form, a solvent of the pyroxyline compound, and a gum for binding the particles of pigment together.

2. An ink for use in printing upon celluloid or other pyroxyline compounds, consisting essentially, of insoluble pigment in powdered form, a gum for holding the particles of pigment together, and a volatile oil which is or becomes a solvent of the pyroxyline compound.

3. An ink for use in printing upon celluloid or other pyroxyline compounds, consisting essentially, of insoluble pigment in powdered form, a gum for holding the particles thereof together, and a solvent consisting essentially, of oil of cassia.

4. An ink for use in printing upon celluloid or other pyroxyline compounds, consisting essentially, of insoluble pigment in powdered form, shellac, and a solvent of the pyroxyline compound.

5. An ink for use in printing upon celluloid or other pyroxyline compounds, consisting essentially, of insoluble pigment in powdered form, shellac, and a solvent consisting essentially, of oil of cassia.

Signed at Newark, in the county of Essex and State of New Jersey, this 29th day of November, A. D. 1886.

MARSHALL C. LEFFERTS
JOHN H. STEVENS.

Witnesses:
ISAAC F. ROE,
ABRAHAM MANNERS.

Patented Dec. 26, 1922. 1,439,696

UNITED STATES PATENT OFFICE.

HOWARD WATERS DOUGHTY, OF AMHERST, MASSACHUSETTS, ASSIGNOR TO ALCHEMIC GOLD COMPANY, INC., A CORPORATION OF NEW YORK.

INK.

No Drawing. Application filed August 14, 1922. Serial No. 581,899.

To all whom it may concern:

Be it known that I, HOWARD WATERS DOUGHTY, a citizen of the United States, residing at Amherst, in the county of Hampshire, State of Massachusetts, have invented certain new and useful Improvements in Inks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to inks and vehicles therefor, and particularly to metallic pigment inks suitable for use in stamping titles and decorative designs on book-bindings and for other purposes to which the ink may be adapted.

In stamping titles in gold, for example, on books, labels and like materials, it has been the practice heretofore to employ gold or imitation gold leaf. The leaf is applied manually after the surface of the material has been treated with size, and the surplus leaf must be removed after stamping. Several operations are thus involved and the application of leaf in the manner described is consequently expensive. The use of artificial leaf effects a saving only in the cost of the leaf. Artificial leaf is, moreover, unsatisfactory because of the inferior quality of the work which quickly tarnishes when exposed to the effect of the atmosphere.

The use of metallic pigment inks has been suggested heretofore as a substitute for metallic leaf in stamping operations. No suitable inks have been available, however, and it has been impossible to produce satisfactory work therewith. A difficulty which has prevented the use of metallic pigment inks is due to vehicles which dry too rapidly on the inking rolls, covering them generally with a gummy coating which prevents transfer of the ink to the type or die. In avoiding this extreme it is necessary to provide an ink which when once applied will dry rapidly.

It is the object of the invention, therefore, to provide an ink and an ink vehicle having the necessary properties, among others comparative slowness in drying without a tendency to become gummy, a consistency permitting transference of the ink through inking rolls to the type or die, rapid drying when applied to the work, and ability to protect the pigment from oxidation and consequent discoloration.

I have discovered that these desirable properties may be imparted to the ink by the use of a suitable medium in the vehicle for the pigment and that such a medium will, moreover, permit rapid drying of the ink by the application of heat to the type or die. The medium should be volatile, i. e., capable of being vaporized without carbonization, but its boiling point should be relatively high to reduce vaporization at atmospheric temperatures, and consequently to prevent rapid drying on the inking rolls. The medium must, moreover, be a solvent for the body of the vehicle. Preferably the boiling point of the selected medium should be between 200° and 300° C., a boiling point lower than 250° C. being desirable. Solvents boiling materially below 200° C. are unsuitable because the ink dries too rapidly on the rolls and becomes gummy. Solvents boiling materially above 300° C. are likewise unsuitable because the ink cannot be successfully dried except by the application of impracticably high temperatures. A suitable medium may be found in the derivatives of the terpene series of hydrocarbon compounds; the alcohols, of which terpineol is an example, being admirably adapted for the purpose. Terpineol is capable of imparting the desired properties to the vehicle in a marked degree, and is at the same time readily available in commerce and relatively inexpensive. Other suitable solvents are benzyl alcohol and certain esters of aromatic acids such as terpinyl acetate, benzyl acetate and ethyl benzoate. Oil of dammar resin is also a suitable solvent, this and the other solvents mentioned having the distinguishing characteristics above referred to.

In carrying out the invention the solvent is combined with a thickening agent forming the body of the vehicle. Preferably a resinous material such as colophony (ordinary rosin), dammar, copal, Bergundy pitch or Canada balsam, or a synthetic resin, i. e., a phenol condensation product, is dissolved in the solvent to produce a vehicle of the desired consistency. A proportion of benzoin may be added with advantage to the composition, replacing a portion of the other resinous material, or benzoin may be substituted for either of the resins mentioned, which, of course, may be mixed or combined in any desired proportions, although for commercial reasons it is preferred to employ colophony

alone as a resinous ingredient of the composition. The pigment, preferably a bronze or other metallic powder of the desired color, is thoroughly incorporated with the vehicle to complete the ink.

It is to be understood that equivalents of the terpineol, benzyl alcohol or other solvent may be substituted therefor and that materials naturally containing these solvents may be employed. Artificial mixtures containing the solvents mentioned may be used also. Natural or artificial mixtures of the solvent should have a minimum boiling point of substantially 200° C. to avoid too rapid drying of the ink upon the rolls.

I have also discovered that certain higher boiling liquid saturated paraffin hydrocarbons, e. g., those present in fractions of kerosene boiling above 250° C. at normal pressure may be employed instead of terpineol. These higher boiling fractions are mixtures of hydrocarbons, and, while not so desirable as terpineol, they nevertheless are capable of producing a satisfactory ink when used as a solvent for the resin. The paraffin compounds referred to may be combined with terpineol and terpineol-containing mixtures also with successful results.

The bronze or other metallic powder used may be the ordinary article of commerce and may consist, for example, of an alloy of copper with other metal or metals adapted to impart the desired color to the alloy. The alloy is reduced to a state of fine sub-division in the usual manner. Metallic powders containing metals other than copper can be used.

As an example of the application of the invention, the vehicle may comprise four parts of the solvent, terpineol or benzyl alcohol for example, to one part of ordinary rosin. Preferably the solvent is heated to a temperature ranging from 100° to 130° C. and is maintained at that temperature while the rosin is dissolved therein. The proportions of resin and solvent may be varied within the limits necessary to produce a vehicle of the proper viscosity. The vehicle and metallic powder are thoroughly mixed preferably in the proportions of two parts of the powder to one part of the vehicle.

The ink produced as described may be applied by means of the usual ink fountain or table to the inking rollers and thence transferred to the type or die. Drying of the ink on the rollers, a fault which has characterized inks heretofore suggested, is avoided. The ink dries very slowly at atmospheric temperature owing to the high boiling point of the volatile solvent. It dries rapidly, however, when applied with a heated die. The impression is highly glossed and the vehicle forms a lacquer which protects the pigment from tarnishing, thus providing a permanent and highly satisfactory title or decoration on book bindings and the like. The color will depend upon the particular pigment employed which may be other than metallic in character.

The ink described, though particularly suitable for book-binders' use, will serve other purposes of decorative printing. It is adapted to materially reduce the cost of such printing because of the low cost of the ink and the simplicity of its application.

Various changes may be made in the details of the invention without departing therefrom or sacrificing any of the advantages thereof.

I claim:—

1. An ink having a metallic pigment and a vehicle comprising a resinous substance and terpineol as a solvent therefor.

2. An ink having a metallic pigment and a vehicle comprising a resinous substance and a mixture of terpineol with other solvents for the resinous substance.

3. An ink having a metallic pigment and a vehicle comprising a resinous substance and a solvent containing terpineol.

4. An ink having a metallic pigment and a vehicle comprising a solvent containing terpineol and a thickening agent dissolved therein.

5. An ink having a metallic pigment and a vehicle comprising ordinary rosin dissolved in a solvent containing terpineol.

6. An ink having a metallic pigment and a vehicle comprising ordinary rosin dissolved in terpineol.

7. In an ink a vehicle comprising a solvent containing terpineol and a thickening agent dissolved therein.

8. In an ink a vehicle comprising terpineol and a thickening agent dissolved therein.

9. In an ink a vehicle comprising a resinous material and a solvent therefor containing terpineol.

10. In an ink a vehicle comprising ordinary rosin and a solvent therefor containing terpineol.

11. In an ink a vehicle comprising ordinary rosin and terpineol as a solvent therefor.

In testimony whereof I affix my signature.

HOWARD WATERS DOUGHTY.

Patented Apr. 3, 1923. 1,450,692

UNITED STATES PATENT OFFICE.

WILLIAM J. McELROY, OF NEW YORK, AND JOHN CLARKE, OF MANHASSET, NORTH HEMPSTEAD, NEW YORK, ASSIGNORS, BY MESNE ASSIGNMENTS, TO ALCHEMIC GOLD COMPANY, INC., A CORPORATION OF NEW YORK.

PRINTING INK.

No Drawing. Application filed June 16, 1922. Serial No. 568,849.

To all whom it may concern:

Be it known that we, WILLIAM J. McELROY, a citizen of the United States, and a resident of the borough of Manhattan, city, county, and State of New York, and JOHN CLARKE, a citizen of the United States, and a resident of the village of Manhasset, town of North Hempstead, county of Nassau, and State of New York, have invented a new and useful Improvement in Printing Inks, of which the following is a description, as well as of the manner and process of making, constructing, compounding, and using the same, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains or with which it is most nearly connected to make, construct, compound, and use the same.

Our invention relates generally to printing inks and particularly to those having metallic powders as their pigments.

The objects of our invention are the production of improved printing inks adapted for general use and more especially for use in embossing and die-printing upon bookcloth, leather and other materials commonly used for book casings; particular objects are the production of inks of this class which shall be adapted for application by a heated die, plate or other impression member, preheated to embossing temperatures, and which shall be characterized by the qualities of drying immediately under the relatively high temperature preferred in embossing metallic powders; and having properties of strongly adhering to and covering smoothly, evenly and completely the surface upon which they are stamped; of being rendered lustrous by the heat of the metal by which they are impressed upon such object; of permanently retaining their original color and luster without tarnishing or fading; of high boiling point and of low volatility.

Further objects are the provision of an ink with the foregoing qualities which can be mixed ready for use by the manufacturer and which will not corrode or otherwise deteriorate in the container, and which, when packaged, and transported shall remain in its original state with its qualities and both its physical and chemical conditions unimpaired even after long lapse of time.

We have heretofore disclosed in our copending application Serial Number 562,437, filed May 20, 1922, a printing ink attaining the foregoing objects. We have also discovered that an ink composition containing metallic pigments may be produced which will realize the above recited features of advantage by using a non-acid synthetic resin as a binder and protector in lieu of the neutralized rosin typified by an ester of resin as therein claimed.

Our invention consists in the discovery that a coumarone resin has the desired utilities in combination with bronze powders of functioning as a binder to the powders, as an adhesive to the articles stamped, and as a protective coating to the impressed metallic deposit when printed.

The coumarone resins are coal tar condensation products derived from coumarone and indene which are themselves constituents of coal tar naphtha. They are usually yellow in color, and particularly well suited to conjunction with those bronze powders customarily employed as pigments in so-called imitation gold leaf, gold ink and the like compositions, blending therewith without detracting from their pigmentation. While the particular example selected by way of illustration is a gold ink, it is obvious that there are varying shades of bronze powders in the imitation gold powders, and a wide range of metallic pigments known as bronze powders imitating other metals, such as silver and aluminum. These synthetic resins dissolve readily in such energetic solvents as terpineol, pine oil, rosin oil, and the high-boiling mineral oils. Because of its body, which is well adapted to maintain bronze powders in suspension, and its volatility at embossing temperatures, we prefer terpineol as a solvent vehicle for this coumarone binder. As the binder becomes volatile at these temperatures, we preferably admix with the terpineol a small per cent of rosin oil. Since rosin oil at such temperatures is less volatile than terpineol, the mixture preferred as a solvent is approximately 95 per cent of terpineol and five per cent of rosin oil, such minor percentage sufficing to render the binder more plastic when dried, whereby the ink impression is prevented from cracking or scaling off. Rosin oil, because of its low volatility, is not suitable alone as such solvent,

because of the slow drying of the ink impression. Pine oil as a solvent is subject to the like disadvantage imported by terpineol, leaving the impression too brittle. It is not as valuable for the desired purposes because it is commercially variable as a manufactured product, its definite chemical composition not being standardized. If neutral in character, it is suitable as a solvent, but as now produced, it is liable to be acid or to become so when exposed to the air, and react upon the metallic pigments undesirably; otherwise it affords, when mixed with the proper proportions of rosin oil, a suitable non-acid vehicle for the binder.

As an example of the preferred proportions of the ingredients named, we take, by weight, 95 per cent terpineol and 5 per cent rosin oil, and stir until thoroughly mixed.

With 84 per cent of this mixture we incorporate 16 per cent of powdered coumarone resin, e. g., that known under the trade name of "Cumar," and warm this mixture upon a water-bath at 100° centigrade, stirring meanwhile, until the "Cumar" is thoroughly dissolved, which will result in about 20 minutes with vigorous stirring. The batch is then allowed to cool. From this batch we take one-third and add thereto two-thirds of bronze powder, both by weight. This mixture is then stirred until the bronze powder is thoroughly and evenly incorporated. The ink resulting is of pasty and semi-fluid consistency, similar to that of printing inks generally.

As the metallic pigment above intended, we prefer a mixture of bronze powder of the grade known commercially as Hemmerdinger's Special No. 1, with 80 per cent of which is mixed 20 per cent of the finer grade of bronze powders known generally in the trade as "Lining," a more finely comminuted species of such powders.

The proportions above exampled may be varied somewhat without appreciable variation of the product. However, 20 per cent of "Cumar" to 80 per cent of solvent vehicle forms an ink which at certain temperatures tends to clog the impression member. 10 per cent of rosin oil tends under certain temperatures to give a too wet impression, which, until dried, is liable to be too tacky and to smudge. 100 per cent terpineol tends to produce a too brittle impression. The ratio of bronze to vehicle affords more latitude of variation, but an excess of bronze does not work well on the press and clogs the die, the practical limit being about 2½ parts of bronze to one of vehicle.

While thus specifying terpineol and rosin oil as the constituents preferred of our binder solvent vehicle, we wish to be understood as typifying thereby a binder vehicle having the desired properties as such, first, of an active solvent of the synthetic resins named; second, as of the desired body adapted to maintain the bronze powders in sustained suspension; third, as of the requisite degree of volatility to be driven off by the temperature used in embossing metallic pigments to impart the desired luster thereto; fourth, affording that degree of plasticity and elasticity to the impression which will prevent its cracking; fifth, the necessary neutrality which will preserve the metallic particles from corrosion on standing when mixed in ink form; sixth, which shall not cause the impressed characters to tarnish; and seventh, which shall be colorless or of such color as will not detract from the desired metallic luster. Within the limitations imposed by these criteria, the binder vehicle may be any of the solvents named or suitable combinations thereof. This printing composition is primarily intended for printing book covers which, when of cloth, are prepared as cases with a strong coating of glue to hold the cloth to the backing. As the boiling point of the vehicle specified is approximately 428° Fahrenheit, the impression temperature must suffice to drive off the volatile solvent, that the impression may be dry, but must not be so high as to draw the glue through the cloth and thereby cause blisters in the impression or darken it. Preferably, therefore, the described composition should be used as an ink at a temperature substantially that of the boiling point of the solvent vehicle. As will be obvious, however, the ink set forth may be used at lower temperatures, or cold, and the impression artificially dried thereafter.

By virtue of the comparatively high specific gravity of the synthetic resins produced as condensation products of naphtha, and the heavy body of the solvents therefor herein named, the solution obtained affords an especially valuable vehicle for the metallic pigments in that the tendency of the bronze powder to settle is checked and a persistent suspension thereof is attained.

Having thus described the preferred embodiment of our invention and the best method now known to us of producing and usefully applying same, we claim:

1. A printing composition comprising a metallic pigment, a binder therefor consisting of a neutral synthetic resin, and a neutral solvent therefor, the said solvent being volatile at temperatures between 400° and 500° Fahrenheit, and the binder being adapted to constitute a protective coating to the impressed pigment.

2. A printing composition comprising a metallic pigment, a binder therefor consisting of a neutral synthetic resin, a volatile neutral solvent therefor, and an oil less volatile than the solvent adapted to blend with the binder and render it flexible when impressed.

3. A printing composition comprising a metallic pigment, a binder and a high-boiling neutral solvent, the binder consisting of a coumarone resin.

4. A printing composition comprising a metallic pigment, a coumarone resin, and terpineol.

5. A printing composition comprising a metallic pigment, a coumarone resin, terpineol, and rosin oil.

6. A printing composition comprising a metallic pigment, a coumarone resin, and a high-boiling heavy-bodied neutral oil adapted to dissolve said resin.

7. A printing composition comprising a metallic pigment, a synthetic resin, and a high-boiling heavy-bodied neutral solvent of an oily character.

8. A printing composition comprising a metallic pigment, a synthetic resin, and a heavy-bodied neutral solvent.

9. A printing composition comprising a metallic pigment, a synthetic resin and terpineol.

10. A printing composition comprising a metallic pigment, a synthetic resin, terpineol, and rosin oil.

11. A printing composition composed of the recited ingredients in the following proportions by weight: 16 per cent of coumarone resin dissolved in 84 per cent of a solvent composed of 95 per cent terpineol and 5 per cent rosin oil; with metallic powder pigment in the proportion of two parts of pigment to one part of the resin solution.

12. A printing composition comprising the recited ingredients in the following proportions, by weight: 16 per cent of a non-acid synthetic resin dissolved in 84 per cent of a non-acid solvent and metallic pigment in the proportion of two parts of pigment to one part of the solution.

WILLIAM J. McELROY.
JOHN CLARKE.

Patented Apr. 1, 1930 1,752,462

UNITED STATES PATENT OFFICE

WALTER F. SMITH, OF KINGSPORT, TENNESSEE, ASSIGNOR, BY MESNE ASSIGNMENTS, TO KINGSPORT PRESS, INC., A CORPORATION OF DELAWARE

NONTARNISHING METALLIC INK

No Drawing. Application filed November 16, 1927. Serial No. 233,746.

The invention relates to an improvement in the composition of metallic pigment printing inks of the class of such inks which are used for stamping titles and designs on book bindings and the like.

It is a practical requirement in using inks of this character that the vehicles which carry the contained metallic pigments should not dry readily at atmospheric temperature; should dry rapidly when applied to the heated type or dies but should not dry so rapidly as to form gummy coatings thereon, and otherwise it is required that such inks have a readily flowing consistency permitting a smooth and clean transference of the same through the inking rollers to the type or die.

One composition which has been used to meet the peculiar requirements of such inks comprises a metallic pigment, a vehicle therefor including a suitable medium which is a solvent for the body of the vehicle and which evaporates without carbonization and has a boiling point relatively high to reduce vaporization at atmospheric temperature.

Numerous examples of such medium have been suggested, such as the derivatives of the terpene series of hydro-carbon compounds and the alcohols, of which terpineol has been most extensively used. Other suitable solvents are benzyl alcohol and certain esters of aromatic acids, such as terpinyl acetate, benzyl acetate, and ethyl benzoate. The solvent has been combined with a thickening agent forming the body of the vehicle, usually a resinous material, such as colophony (ordinary rosin in a benzyl alcohol solution). This resinous body is dissolved in the medium in various proportions to produce a vehicle of the desired consistency. The metallic pigment, preferably a bronze alloy of copper, or other metallic powder of the desired color, is thoroughly incorporated with the vehicle to complete the ink.

While it is claimed for such known forms of metallic pigment inks, such for example as those containing dissolved rosin and terpineol, that the contained pigment is protected from oxidation and consequent discoloration, and that the vehicle forms a lacquer which protects the pigment from tarnishing, this claim is not confirmed in actual practice. While inks of this character possess the desirable attributes of proper drying reactions and are otherwise satisfactory due to low cost and the like, they have the objection that the inked impressions made therefrom soon become discolored, lose their initial brilliancy and eventually turn black.

Accordingly, the primary object of this invention is to provide a simple form of metallic pigment ink of the character outlined, which will have the desirable properties of the rosin-terpineol type of such inks, and which, at the same time, will feature an ink which when dry will retain its original lustre and be substantially free from tarnishing for a long period of time after it has been applied.

Broadly, this object is attained by adding to the known rosin-terpineol, or equivalent types of metallic pigment ink, a substance capable of forming a protecting coating or lacquer on the metallic particles and which, incidentally, will not have any deleterious effect either on the metal, on its vehicles or on its solvents.

One such substance which has given satisfactory results is nitro-cellulose (pyroxylin) or similar material likewise insoluble in terpineol, dissolved in appropriate solvents such as ethyl acetate, butyl acetate, ethyl alcohol, methyl alcohol, benzol, ether and the like.

In preparing the ink the powdered metal is simply stirred slowly into a solution of nitro-cellulose (pyroxylin) until the metallic particles are completely coated. In one practical instance where a bronze powder was used, the nitro-cellulose (pyroxylin) was present in the proportion of about one part of the pyroxylin to two parts of the metal.

The liquid portion of this lacquer is then driven off in such a way as to leave the coated bronze in powdered form with each small particle covered with a coating of nitro-cellulose. This can be done by ejecting the lacquer through an air jet into a small chamber from which the air is constantly being drawn by a fan through a finely woven silk screen. The metal powder so coated is mixed in the rosin-terpineol, or equivalent vehicle

in the proportion of approximately two parts of the coated powder to one part of the vehicle.

The ink so produced is applied as is usual with the known rosin-terpineol metallic inks, being carried by means of an ink fountain or table to the inking rollers and hence transferred to the heated type or die which reacts to volatilize the solvents present in the liquid composition.

The resulting impression is highly glossed and the presence of the pyroxylin in the vehicle forms a lacquer which protects the pigment from tarnishing, thus providing a permanent and highly satisfactory title or decoration on book bindings and the like, and which protection is not possible with the usual rosin-terpineol types of metallic inks.

Having thus described my invention, I claim:

1. An ink having a metallic pigment coated with nitro-cellulose (pyroxylin) and a vehicle therefor comprising a resinous substance and terpineol as a solvent for the resinous substance.

2. An ink having a metallic pigment coated with nitro-cellulose (pyroxylin) and a vehicle therefor comprising a resinous substance and terpineol mixed with other solvents for the resinous substance.

3. An ink having a metallic pigment coated with nitro-cellulose (pyroxylin) and a vehicle therefor comprising a thickening agent dissolved in a solvent containing terpineol.

4. An ink having a metallic pigment coated with nitro-cellulose (pyroxylin) and a vehicle therefor comprising rosin in a solvent for the rosin containing terpineol.

5. An ink having a metallic pigment coated with nitro-cellulose (pyroxylin) and a vehicle comprising rosin dissolved in terpineol.

6. An ink comprised of rosin, terpineol, a metallic pigment coated with nitro-cellulose (pyroxylin), in which the nitro-cellulose is present in the proportion approximately of one part of nitro-cellulose to two parts of the pigment.

This specification signed this 5th day of November, 1927.

WALTER F. SMITH.

Patented May 26, 1931 1,806,965

UNITED STATES PATENT OFFICE

JOHN H. CLEWELL, OF ARLINGTON, NEW JERSEY, ASSIGNOR TO DU PONT VISCOLOID COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE

INK FOR CELLULOSE ESTERS

No Drawing. Application filed April 12, 1928. Serial No. 269,895.

This invention relates to chemical inks, and particularly to ink for marking and printing on cellulose ester bodies, as cellulose ester plastics and films having cellulose nitrate or cellulose acetate as a base. Although not restricted thereto, it finds particularly valuable use in the application of indicia, e. g. footage numbers, to motion picture film, especially in those cases where the indicia are to be applied by an automatic numbering machine.

A major object of the invention is to provide an ink which, when applied, will remain permanent against abrasion and the attack of photographic developing and washing fluids, and will not have a deleterious effect on the sensitized photographic emulsion, either by contact therewith or by emanation from the ink. It is a further object to provide an ink which will dry rapidly on the ester body but yet will print clearly without blurring and will not gum on the type, and which will be at least partially absorbed into the ester body, but, in the case of motion picture film, will not shrink the perforations. To these ends and also to improve generally upon inks of the character indicated, the invention consists in the various matters hereinafter described and claimed.

Without restricting the invention thereto, the following will serve as an example of an ink in accordance with the present invention, such ink having the above indicated and other, desirable characteristics and being usable for cellulose nitrate and cellulose acetate bodies:—

	Grams
Diacetone alcohol	200
National nigrosine base N	20
Orange shellac	80

The above, it will be noted, comprises a solvent for either cellulose nitrate or acetate, e. g. diacetone alcohol, a dye, and a thickener, e. g. shellac. Any good nigrosine base may be substituted for the black one given. Blue ink can be made by the use of any of the spirit blues, and green by the use of malachite green or diamond green. Other suitable gums may be substituted for the shellac. The diacetone alcohol, boiling point about 160° C., represents a good cellulose ester solvent (and dye solvent) which gives sufficiently rapid drying without being too highly volatile. In making up the composition, dissolve the nigrosine in the alcohol, filter, and then add the shellac. The rate of drying can be increased by an addition of methyl acetone and decreased by an addition of triacetine.

It will be evident that the proportions of the ingredients may be considerably varied from those given above. An important feature is the use of a high-boiling solvent which has a strong solvent action on the material to be marked, and at the same time is a good solvent for dyes. The boiling point of the solvent should be high, so that the ink does not dry on the printing tool, but not so high as to retard its drying rate unduly. A boiling point between 140° C. and 225° C. is most suitable, but this range is not essential. When used on the plastic the ink sets quickly, largely by absorption into the plastic. Diacetone alcohol is a solvent which peculiarly meets these requirements. Other solvents which might be used are ethyl lactate, and diethylene glycol.

I claim:

1. Ink for cellulose ester bodies comprising a cellulose ester solvent having a boiling point substantially between 140° C. and 225° C., a nigrosine base soluble therein, and a thickener.

2. Ink for cellulose ester bodies composed of diacetone alcohol, a dye soluble therein, and shellac.

3. Ink for cellulose ester bodies composed of ethyl lactate, a dye soluble therein, and shellac.

4. Ink for cellulose ester bodies composed of diethylene glycol, a dye soluble therein, and shellac.

In testimony whereof, I affix my signature.

JOHN H. CLEWELL.

Patented Oct. 25, 1932 1,884,553

UNITED STATES PATENT OFFICE

THEODORE F. BRADLEY, OF WESTFIELD, NEW JERSEY

COMPOSITION INTENDED FOR COATING, DECORATING, AND PRINTING WOOD, METAL, PAPER, CLOTH, AND OTHER SURFACES

No Drawing. Application filed April 11, 1927. Serial No. 183,011.

This invention relates to nitrocellulose coating compositions and to the process of making same, and particularly relates to compositions suitable for the manufacture of artificial leather, coated fabrics, printing lacquers and various other products where a particularly low volatility is necessary.

It is the object of my invention to provide nitrocellulose coating compositions which shall be almost non-volatile at ordinary room temperature, that, is, at approximately 70° F., and yet which will dry quickly at slightly elevated temperatures, for example, at about 140° F. This is of particular importance where liquids of alleged toxic nature, such as for example, benzol, are employed, and also when improved flowing and working qualities are desirable. Thus, in the manufacture of artificial leather where benzol is often used in admixture with ethyl acetate to form a solvent vehicle for nitrocellulose, various ills have been attributed to the vapors of benzol. One of the features of the present invention comprises a method for reducing, and, in fact, practically eliminating all evaporation of benzol at ordinary room temperatures from nitrocellulose solutions or dopes, although not preventing the evaporation when the temperature is elevated, such as when the coated materials are passed through ovens, equipped with ventilating devices or solvent recovery systems. It is sufficient to minimize evaporation at room temperatures so that the coated fabrics and solutions which the workmen handle, will not produce poisoning.

Another feature of this invention comprises a method of reducing the volatility of nitrocellulose lacquers, so that they may be utilized in the production of printing compositions in place of ordinary printing and lithographing inks. Nitrocellulose solutions as ordinarily made are relatively and progressively quick-drying, and therefore cannot be used successfully for the purposes indicated.

Attempts have been made to secure easy flowing and slow drying lacquers by utilizing as solvents extremely high boiling solvents of low volatility. Such solvents as glycol diacetate, glycol and glycerine ethers and esters, benzyl acetate, and various other cellulose ester solvents of the same range of volatility having been considered. These vehicles are rather costly and furthermore, have the disadvantage of being somewhat too slow drying, even when the materials are oven dried. Under the present invention I effect less expensive and generally more satisfactory results.

This invention comprises nitrocellulose coating compositions which contain a solvent for nitrocellulose easily volatile at ordinary room temperatures, preferably with a diluent of like volatility, together with such a percentage of a wax as will prevent appreciable evaporation of said solvents and yet yield a surface finish substantially free from rings, pock marks, waxy finish, or other such irregularities commonly caused by excess wax. It has been found that waxes such as Japan and carnauba waxes are of but little value in accomplishing the object of this invention, the most satisfactory results having been secured from either paraffin or ceresin wax. Furthermore, definite proportions have been determined, the use of substantially greater amounts than those stipulated tending to reduce the gloss of the coatings and to produce rings, pock marks, waxy surfaces, and various other surface irregularities, while the use of substantially lesser amounts does not satisfactorily check evaporation at room temperatures.

Thus a lacquer composition suitable for printing may be made as follows:

	Parts by weight
Rosin ester	40
Dibutyl phthalate	90
One-half second viscosity nitrocellulose	75
Zinc oxide	140
Butyl acetate	150
Toluol	150
Ethyl alcohol	30
Ceresin wax	2

This printing lacquer does not dry readily at ordinary room temperatures and yet has been found to dry very rapidly when surfaces coated with it are placed in an oven at

about 120° to 140° F. The composition has been found to dry to a flexible and glossy smooth surface. In manufacturing such a composition the wax and resin are dissolved in a portion of the solvent mixture. The nitrocellulose may be dissolved in a separate portion of the same solvent mixture. The pigment may then be ground in the plasticizing agent, or in a mixture of the wax and resin solution and the plasticizing agent. This may be accomplished by means of an ordinary flat stone or roller paint mill. The presence of the wax is valuable in this operation. In some cases the grinding may be accomplished by means of a ball mill. After the pigment has been ground in the manner indicated the various solutions are admixed to give a composition substantially as indicated.

Various other types of resins may be employed such as are commonly used in nitrocellulose compositions, including all of the usual natural resins, as well as such synthetic resins as benzoic phthalic glyceride resin, rosin phthalic glyceride resin, Congo rosin phthalic glyceride resin, castor oil phthalic glyceride resin, and also a special type of resins produced from cottonseed oil fatty acids, phthalic anhydride and glycerol. In some cases, all resin may be omitted. Various other types of plasticizing agents may be employed, or mixtures thereof, among which are castor and rapeseed oils, dibutyl and diethyl phthalate, tricresyl phosphate, camphor, and other nitrocellulose softening or plasticizing agents. Any of the usual pigments may be likewise employed, according to the general character of the coating desired.

Various solvents may be employed in the production of the new type coating compositions. All of the usual nitrocellulose solvents of a low or medium volatility may be employed, it merely being necessary that said solvents, or mixtures thereof, have sufficient solvent action on the wax to maintain the same substantially in solution; sufficient to function in the manner aforesaid. Thus, either ethyl, propyl, butyl, amyl and hexyl acetates or propionates may be used, in some cases alone or more preferably in admixture with various alcohols or hydrocarbon diluents of like degree of volatility. Other nitrocellulose solvents such as acetone, ethyl methyl ketone and similar volatile solvents may likewise be employed to produce satisfactory solvent vehicles. The proportion of wax may be altered slightly, according to the solvent mixtures employed, although it is in all cases necessary that sufficient wax be used to render satisfactorily slow drying at room temperatures, while avoiding the use of such excessive amounts as will disrupt the surface finish. This will vary slightly according to the solvent mixtures employed and also according to such variations in room temperature as may obtain. In general, it is not advisable to employ substantially over 2 per cent (on the weight of the solvents employed) of paraffin or ceresin wax, much larger amounts having been found to produce defective surface finishes. Nor is it advisable to use much less than ½ of 1 per cent of said waxes. Less wax can be used in cold weather to good advantage in some cases. The use of alcohols have been found of some value in reducing the viscosity of the nitrocellulose solutions, and this is of particular value in the production of printing lacquers. Replacement of 100 parts of toluol with a like amount of butyl alcohol, for example, gives lowered viscosity. The wax content then may be 1½ instead of 2 parts.

The reduction in viscosity due to the addition of a substantial proportion of alcohol is valuable in the production of nitrocellulose printing inks. By such reduction in viscosity adhesion of the type to the paper is considerably reduced. On the other hand, the presence of a high proportion of alcohol tends to throw the wax out of solution and therefore it is best to reduce the content of the wax, keeping in mind that any precipitated wax is likely to affect the gloss or appearance of the surface. Avoidance of wax markings on the surface may be attained by proportioning the solvents with respect to the wax, so that the varnish or lacquer on drying does not expel wax from the coating in such a manner as to yield a disfigured surface. It will be noted in the illustrative formula that I have shown a proportion of 2 parts of wax to 75 parts of nitrocellulose. As a general rule, I aim to have the content of wax very much less in proportion than that of the nitrocellulose. In this manner, furthermore, wax markings are minimized.

The hydrocarbon such as benzol, toluol, solvent naphtha, and the like, serves as a solvent for the wax, although acting as a precipitant for the nitrocellulose. On the other hand, the nitrocellulose solvents, as a rule, are poor solvents for wax. Therefore, to proportion a composition having the requisite solubility for nitrocelullose and for wax and containing a minimum amount of wax consistent with the substantial hindering of evaporation of the wax at room temperature, calls for a consideration of the principles set forth in the present specification.

It has been proposed to employ wax in paint and varnish removing compositions to retard evaporation, but in such compositions the proportion of wax is not confined to very narrow limits. Whereas, in my composition a definite limitation is placed on the wax content to avoid surface defacement. In my composition the wax preferably is maintained almost entirely in solution or dispersion

through the aid of the nitrocellulose functioning as a protective colloid. Furthermore, the present application relates to compositions which are intended for coating purposes, that is, to cover over or ornament a surface, or to produce printed impressions, and the like, whereas the aforesaid paint and varnish removers are intended for the removal of coatings. In other words, my composition is intended for a totally different purpose than paint and varnish remover and is, moreover, prepared with respect to considerations of a character totally different from those obtaining in meeting the requirements of paint and varnish removers.

My invention therefore comprises a composition adapted for coating surfaces such as the production of artificial leather, or for printing surfaces of paper, leather, and the like, and for other similar operations where a flexible surfacing is to be applied, such composition comprising nitrocellulose or cellulose acetate or other analogous soluble cellulose material dissolved in a volatile solvent, sometimes unitary, but preferably a composite one, preferably composed of a mixture of nitrocellulose solvents and wax solvents and containing a proportion of wax very slight with respect to the total amount of the composition, but sufficient to substantially prevent evaporation, at say, 70° F., while not materially preventing evaporation at temperatures somewhat above 100° F.

To secure a maximum degree of wax-dispersing effect with a minimum of wax-expulsion with the object of eliminating surface defacement by the wax, I preferably employ low viscosity nitrocellulose such as the one-half second and four second material have a desirable cooperating action with the mineral wax or other wax employed. With such low viscosity nitrocelluloses I may use a more effective concentration of wax and still keep the proportion of wax below a surface-defacing concentration. Employment of low viscosity nitrocellulose in conjunction with a modicum of wax in compositions intended for coating, decorating and printing wood, metal, paper, cloth, and other surfaces, constitutes a feature of the preferred form of my invention.

I have set forth paraffin or ceresin wax in the preferred compositions, and in general, have preference for a mineral wax; ceresin, because of its amorphous character being of particular value from the standpoint of effective dispersion and adequate proportion at a concentration approaching the surface-defacing point. Beeswax and other waxes or mixtures of waxes, e. g., a mixture of beeswax and ceresin wax having properties like, or approximating the mineral waxes as set forth herein are included within the purview of my invention, which embraces substances, a modicum of which greatly reduces evaporation of the unitary or composite volatile solvent vehicle at room temperature while permitting free escape thereof at slightly elevated temperatures. In its more specific aspects the invention is concerned with a printing paint of the character set forth above.

The proportions in the illustrative example may be varied and the components altered in grade or quality as desired within wide limits (except as regards proportion of wax as has been described). Some of the components are not essential at all times, and plasticizer, for example, may be omitted in some cases. The resinous body likewise may be omitted if a pronounced gloss or strong adhesion is not needed. The unpigmented composition may be employed as a transparent or translucent coating.

What I claim is:

1. In compositions intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces, a medium comprising nitrocellulose, a composite volatile solvent vehicle therefor, a resin, a plasticizer, a pigment, and a modicum of wax greatly reducing evaporation of the solvent vehicle at room temperature while permitting free escape thereof at slightly elevated temperatures; said proportion of wax being below a surface-defacing concentration whereby the composition dries to a smooth glossy surface.

2. In compositions intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces, a medium comprising low viscosity nitrocellulose cooperating with a modicum of wax to greatly reduce evaporation of the solvent at room temperature while permitting free escape thereof at slightly elevated temperatures; said proportion of wax being below a surface-defacing concentration.

3. A printing paint comprising nitrocellulose, a solvent, and from ½ to 2 percent of ceresin wax.

4. A printing lacquer comprising nitrocellulose a solvent containing sufficient alcohol to reduce the viscosity of the solution, and an amount of wax sufficient to reduce evaporation of the solvent but insufficient to cause wax markings on the printed surface.

5. In compositions intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces, a medium comprising nitrocellulose, a volatile solvent, and a modicum of wax greatly reducing evaporation of the solvent at room temperature while permitting free escape thereof at slightly elevated temperatures.

6. In compositions intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces, a medium comprising low viscosity nitrocellulose cooperating with a modicum of wax below a proportion of wax of surface defacing concentration.

7. In the preparation of materials for use

in cellulose ester dopes, the step of grinding pigment in a wax solution, and incorporating the product with a cellulose ester.

8. In the preparation of materials for use in cellulose ester dopes, the step of grinding pigment in a solution of wax and resin, and incorporating the product with a cellulose ester.

9. In the preparation of materials for use in nitrocellulose dopes, the step of grinding pigment in a wax solution containing a plasticizing agent for nitrocellulose, and incorporating the product with a cellulose ester.

10. A material for use in cellulose ester dopes, comprising pigment ground in a wax solution containing a plasticizing agent for nitrocellulose.

11. In compositions intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces, a medium comprising low viscosity nitrocellulose in solution in a vehicle including a wax solution and pigment ground in that wax solution.

12. A composition intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces comprising low viscosity nitrocellulose, a solvent vehicle, and a mineral wax, the ratio of nitrocellulose to wax being high enough to prevent surface marking on a deposited coating.

13. A composition intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces comprising nitrocellulose, a solvent vehicle including an aromatic hydrocarbon diluent and alcohol, and a mineral wax, the amount of wax being sufficient to prevent substantial evaporation of the hydrocarbon diluent at temperatures of about 70° F. without producing surface marking.

14. A composition intended for coating, decorating and printing wood, metal, paper, cloth and other surfaces comprising nitrocellulose, a solvent vehicle including benzol and a mineral wax, the amount of wax being sufficient to prevent substantial evaporation of the benzol at temperatures of about 70° F. but insufficient to prevent substantial evaporation of the benzol at temperatures above 100° F.

15. A composition as set forth in claim 14 in which the amount of wax is below that which will produce undesired surface markings in a coating of the material deposited from the solution.

THEODORE F. BRADLEY.

May 17, 1932. W. S. LAWRENCE 1,858,673

TRANSFER

Filed May 3, 1929

Fig: 1.

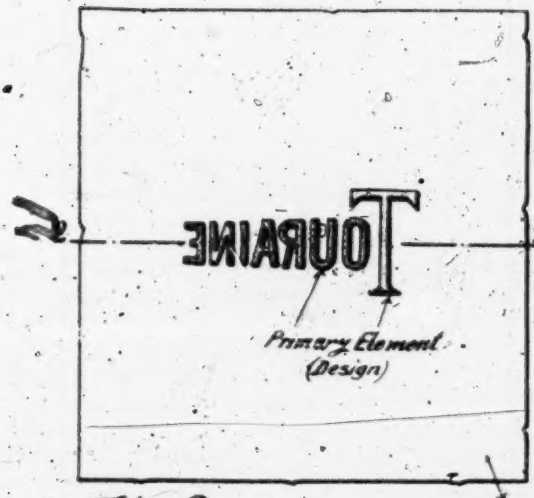


Fig: 2.

Fig: 3.

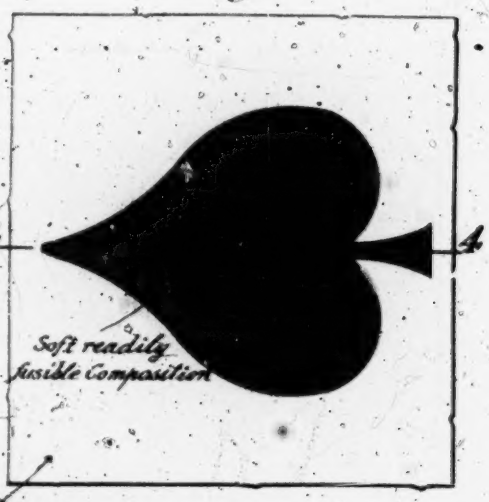


Fig. 4.

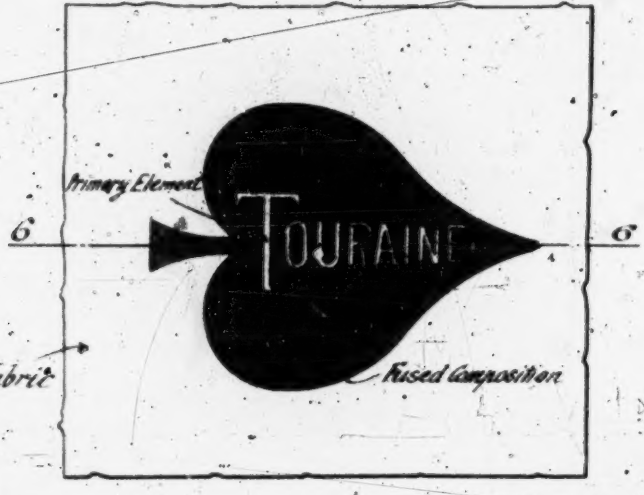
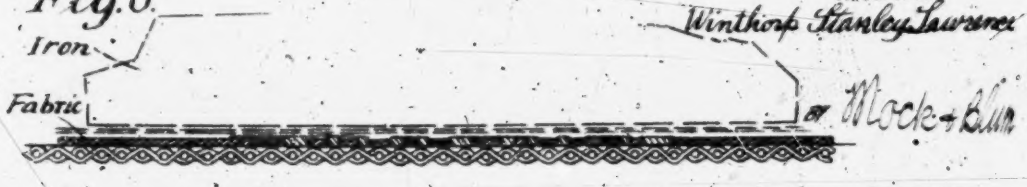


Fig. 6.



INVENTOR
Winthrop Stanley Lawrence
BY Mock + Blum
ATTORNEYS.

Patented May 17, 1932

1,858,673

UNITED STATES PATENT OFFICE

WINTHROP STANLEY LAWRENCE, OF BROOKLYN, NEW YORK, ASSIGNOR TO KAUMAGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

TRANSFER

Application filed May 3, 1929. Serial No. 360,305.

My invention relates to a new and improved transfer.

One of the objects of my invention is to provide a new and improved multi-colored transfer, and in particular a new and improved two color transfer.

Another object of my invention is to provide a heat transfer which shall make a very clear and distinct impression so that it can be used to mark fabrics having a complicated and confusing pattern.

Other objects of my invention will be set forth in the following description and drawings, it being understood that the above general statement of the objects of my invention is intended to generally explain the same and not to limit it in any manner.

Fig. 1 is an elevation showing how the primary element on the transfer is applied to the paper base.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is an elevation showing how the primary element is overprinted with a background.

Fig. 4 is a sectional view on the line 4—4 of Fig. 3.

Fig. 5 shows how the transfer marking is applied to a fabric.

Fig. 6 is a sectional view on the line 6—6 of Fig. 5, the pressing iron being also diagrammatically shown.

In the drawings, the respective parts are indicated by suitable legends.

It has heretofore been a serious problem to produce transfers which could make a clear impression upon materials woven with complicated patterns. It has been proposed to make a transfer which shall produce an embossed impression or to increase the size of the transfer. It is not always possible to use a transfer of the embossing type, and it is usually undesirable to make the transfer too large. It has been proposed to make two color transfers for this purpose, but it was found that the lettering or pictorial elements of the design or the like, would run into the background.

In order to provide a satisfactory two color transfer, I have found it necessary to use a tough plastic slow-fusing composition for making the impression of the trade mark or design, which constitutes what may be called the "primary element" of the transfer. I have also found it necessary to combine this type of composition for the "primary element" of the transfer with a soft waxy quickly melting marking composition for making the background.

I prefer to print a mixture of rosin and wax, combined with suitable coloring ingredients, for forming the readily fusible background. Any suitable quickly-fusing composition may be utilized for this purpose, such compositions being well known in the art per se.

The "primary element" of the two color transfer is preferably made from an ethylated cellulose product sold in the trade as "A. T." cellulose. This is a fine powder consisting of intermixed brownish and whitish particles. This ethylated product can be readily distinguished from cellulose nitrate, because cellulose nitrate is sold in the form of filaments. The ethylated cellulose differs from cellulose acetate because the ethylated cellulose particles are harder and form less of a pulpy mass. Likewise, the ethylated cellulose can be dissolved in numerous solvents in which neither cellulose acetate nor cellulose nitrate are soluble, such as xylol and other benzyl derivatives, such as toluol, for example. As an equivalent for the ethylated cellulose for this purpose, I can use a product sold under the trade name of benzyl cellulose which has substantially the same physical and chemical properties as the ethylated cellulose, save that the benzyl cellulose powder consists of relatively large coarse particles intermixed with finer particles. The ethylated cellulose

and the benzyl cellulose begin to soften at about 150° C., but they then begin to decompose so that it is not possible to liquefy these products without decomposing them. However, these substances can be heated to all ordinary temperature without decomposing, and without melting.

In order to produce a slow-melting composition with the use of these cellulose products, the said cellulose products can be combined in varying proportions with fusible substances, such as resins. Likewise, these cellulose derivatives are soluble in a great many solvents having high boiling points, such as the substance sold under the trade name of "Lindol", and other plastercizers. "Lindol" consists essentially of tri-cresyl phosphate.

Hence, it is not necessary to mix or combine the ethylated cellulose or the benzyl cellulose with a resin. By intermixing these preferred cellulose derivatives with a sufficiently large proportion of a suitable plastercizer, such as lindol for example, and with a sufficient quantity of relatively volatile solvent, a flexible marking transfer composition can be secured.

However, in order to secure an impression of relatively low penetrating power, I prefer to use the following:—

100 parts of ethylcellulose.
90 parts of high melting cumar.
45 parts of butyl carbitol.
75 parts of ethyl abietate (or lindol).
35 parts of No. 6 Lithographic varnish.

Likewise, a quick-fusing composition for the background can consists of the following:

100 parts of rosin.
25 parts of beeswax.
30 parts of ultramarine blue.

The trade name "Cumar" refers to paracoumarone resin. The trade name "Butylcarbitol" refers to the mono-ethyl-ether of diethylene glycol. The trade name "Lindol" refers to tricresyl phosphate.

In order to make the improved two color transfer, an ordinary paper base is first printed with the "primary element" or design, by means of the ordinary intaglio method, such as the use of the ordinary intaglio roller engraved in the well known manner.

The background is now printed with the soft readily fusible composition by the use of the same intaglio printing method.

In order to apply this transfer to a piece of fabric, the ink side of the paper transfer base is applied to the fabric, and the other side of the transfer base then has a hot iron applied thereto. That is, the primary element and the background can be released by heat and pressure.

The soft waxy background first melts and thoroughly penetrates the fabric. The less fusible design or "primary element" then melts, but it does not penetrate the fabric, because the fabric has already become either wholly or partially saturated at this point with the dark background composition. Likewise, the composition forming the printed letters of the design or the like, are relatively non-penetrating and infusible, as previously described.

Hence, the background is printed last and is transferred first.

The printed matter or design has a very light color and the background has a dark color so that it acts as a mask to hide the weave of the fabric. The use of a dark background is particularly desirable when the fabric has a complicated weave. While I prefer to use compositions of different fusibility for the background and for the design, I could also use two very slowly fusible compositions which would not run into each other.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions could be made without departing from its spirit.

I claim:

1. A heat transfer having a base on which a primary element is printed with a fusible composition, and a background element which overlays said primary element, said background element being printed with a composition which melts at a lower temperature than said first mentioned composition, said primary element and said background element being releasable from said base by means of heat and pressure.

2. A heat transfer comprising a paper base having a design printed thereon by means of a fusible composition, said design being overprinted with a second fusible composition which melts at a lower temperature than the first mentioned composition, said design and the overprinted part of the transfer being releasable from the base by means of heat and pressure.

3. A heat transfer comprising a paper base having a design printed thereon by means of a fusible composition which includes a cellulose product, said design being overprinted with a second design comprising a fusible penetrating composition, said last mentioned composition melting at a lower temperature than said first mentioned composition, said designs being releasable from said base by heat and pressure.

4. A heat transfer having a base on which is printed a primary element and a background which overlays said element, said primary element and said background each consisting of fusible compositions which remain free from each other when they are melted while the transfer is applied, said primary element and said background being releasable from said base by means of heat and pressure.

5. A heat transfer having a base on which is printed a primary element of a light color and a background element of a dark color, said primary element and said background each consisting of fusible compositions which remain free from each other when they are melted, said primary element and said background element being releasable from said base by means of heat and pressure.

In testimony whereof I affix my signature.

WINTHROP STANLEY LAWRENCE.

Patented Apr. 10, 1934 1,954,450

UNITED STATES PATENT OFFICE

1,954,450

MARKING COMPOSITION

Winthrop Stanley Lawrence, New York, N. Y., assignor to Kannagraph Company, New York, N. Y., a corporation of New York

No Drawing. Application February 20, 1930, Serial No. 429,137

4 Claims. (Cl. 41—33)

My invention relates to a new and improved marking composition.

One of the objects of my invention is to provide a new and improved marking composition, which shall be suitable for making a transfer ink of the fusible type.

A transfer ink of this type is used in the molten condition in order to make a marking on a paper base, and the transfer ink is released from the paper base when it is pressed against the fabric or other article to be marked, with simultaneous use of heat.

Another object of my invention is to wholly or substantially eliminate the necessity of using beeswax in fusible transfer inks, as beeswax is very expensive.

Another object of my invention is to provide a wax-like composition which will be non-sticky so that it can be used for printing in warm weather.

Another object of my invention is to provide a composition from which the wax can sufficiently separate when the composition is cooled in order to form a surface film which prevents stickiness.

Another object of my invention is to provide a composition by means of which a sufficiently flexible marking can be formed, so that there is no tendency to chip.

Another object of my invention is to provide a composition which will make it possible to use ozokerite (ozocerite).

Another object of my invention is to provide a composition in which the comparatively cheap ozokerite is combined with a phenol-condensation product, such as "Amberol" together with a blown oil. The name "Amberol" is used in the trade to designate a product which is also identified by the names "Albertol" and "Albertole". These products are generally referred to in the text-book entitled "Synthetic Resins and Their Plastics" by Carlton Ellis, published in 1923, pages 147 and 148. Generally speaking, these products are phenol-formaldehyde condensation resins which have been caused to condense in the presence of an added resin, such as common rosin, so that the resultant product is soluble in benzol, acetone, and the like. These condensation products are also soluble in fatty oils, such as linseed oil.

Other objects of my invention will be set forth in the following description which illustrates a preferred embodiment thereof, it being understood that the above general statement of the objects of my invention is intended merely to generally explain the same and not to limit it in any manner.

Beeswax has heretofore been largely used in making transfer compositions, due to the fact that this material is amorphous and imparts flexibility to a resinous and fusible marking composition. The beeswax also tends to form a waxy film on the surface of the cooled and solidified marking which hinders or prevents offsetting.

When a fusible marking composition which contains beeswax is allowed to solidify and to cool to ordinary room temperature, the wax slightly separates, thus forming the surface film, which prevents the marking from remaining sticky.

Waxes of the type of paraffin, ceresin, etc. which are not amorphous like beeswax, tend to separate to a greater extent, and since such material form minute crystalline particles, the print or marking is brittle so that it tends to chip when it is handled.

Hence, beeswax has been used almost exclusively in making marking compositions in which it was desired to eliminate offsetting. It has heretofore been found impossible to find a cheap substitute for beeswax, save that carnauba wax has been used in small proportions in marking compositions, without however, replacing the beeswax.

I have found it possible to make a very satisfactory composition by combining a suitable phenol-condensation product, such as "Amberol", combined with "Ozokerite", together with a blown oil, such as blown rapeseed oil. The artificial resin known as "Cumar" can also be combined with this composition. Since this composition is neutral, a bronze powder can be added in order to make a gold-colored marking, and this gold-colored marking does not tarnish. This is a decided advantage because when resin and beeswax are used in a composition of this character, the composition then contains certain acids such as the resin acids which produce more or less tarnishing. The composition is extremely stable and waterproof so that the final transfer markings made on a fabric or the like, are resistant to water and to the solutions of any chemicals, such as the washing liquids used in laundry operations. The wax in the composition solidifies very quickly, so that the machine which applies the same can be rapidly operated, and the composition is extremely dry when the paper transfer base is wound up. This is a great advantage when working in hot weather, since ordinary compositions remain hot and soft, so that when the paper base is wound into a spiral roll, offsetting is produced.

To illustrate the invention more specifically, I

give the following example, although I do not wish the invention to be restricted thereto:—

10 parts of "Amberol",
4 parts of ozokerite,
2 parts of blown rapeseed oil,

are fused and intermixed until the melted composition is then thoroughly homogeneous. Any suitable coloring material is then added to the composition with thorough intermixing, and the composition is then ready for use on the machines. It is to be understood that the proportions given in the examples specified herein are by weight.

Another useful composition can be made by melting together the following:—

100 parts of Cumar; varnish grade.
12 parts of ozokerite.
20 parts of blown rapeseed oil.
12 parts of No. 6 lithographic varnish.
5 parts of Butyl Carbitol.
2 parts of cobalt drier.

When the ingredients of this composition have been thoroughly intermixed while the fusible ingredients thereof are in the molten condition, color is stirred in and the composition is then panned.

The chemical formula of Butyl Carbitol is diethylene-glycol-mono-butyl-ether. This solvent has a boiling point of 222° C.

Heretofore in making transfer marking compositions of the fusible type, it has been customary to add a blown oil thereto. This blown oil was only partially oxidized when the transfer was printed by applying the fusible marking composition by means of a suitably engraved roller to a paper base. The transfer marking on the paper base aged by exposure. That is, the outside of the transfer marking contained some of the blown oil which became more oxidized, so as to form a surface film. The portion of the transfer marking which was in contact with the paper base remained unaffected by air.

It was often desirable to age the transfer for a substantial period of time, because a transfer which had an oxidized surface film would not penetrate the fabric as readily as a freshly-made transfer. This caused the transfer marking to remain more on the surface of the fabric, hosiery, or the like, so that the marking was much more clear, and a species of embossed effect was secured. However, the problem of controlling the proper aging of the transfer was a difficult one, because the user of the transfers might require them at varying intervals of time after the transfers were purchased.

In order to hasten the aging action, it has been proposed to use solvents of various kinds in the marking composition. However, the printing of the transfer is usually accomplished when the marking composition is kept at a temperature of 100° C. Ordinary solvents evaporated too rapidly, so that the composition of the marking material varied rapidly, and this expedient was not commercially practical.

The advantage of using Butyl Carbitol is that it is a solvent of the solid materials used in the composition. In addition to having a sufficiently high boiling point, Butyl Carbitol has a high vapor pressure at about 100° C., so that it does not evaporate with sufficient rapidity to substantially vary the composition of the marking material. Many solvents have relatively high boiling points, but they have very low vapor pressures at about 100° C., so that they evaporate too rapidly to be of practical use.

The Butyl Carbitol remains in the composition after the transfer marking has been printed upon the paper base of the transfer, and it then evaporates with sufficient rapidity during the first twenty-four hours, so that the transfer is then sufficiently aged, so that it is possible to immediately use the transfer. The effect is the same as though the ordinary transfer was held in storage for days. The initial relatively-quick evaporation of the Butyl Carbitol causes the formation of a surface film upon the transfer marking, so that the subsequent evaporation of the Butyl Carbitol is very slow. The transfer is therefore maintained in the proper condition for many days. That is, when the composition previously specified has been prepared, and after said composition has been panned, said composition contains a substantial percentage of the Butyl Carbitol. In order to use this composition for printing the marking upon the transfer base, said composition is melted, and it is applied in the usual manner by means of intaglio rollers. The printed marking upon the transfer base contains some of the Butyl Carbitol, and this evaporates with sufficient rapidity during a relatively short time, so that there is a great economy of time and cost in aging the transfer. Likewise, when the transfer has been sufficiently aged to enable it to be used, it remains stable for a long period of time, as the aging effect is not increased.

The improved composition therefore makes it possible to provide a transfer which can be quickly used and which remains relatively stable and unaltered for a sufficiently long period of time for all practical purposes.

While I have found Butyl Carbitol to be the best commercial material available, I do not wish to be limited thereto, as this invention is pioneer in that it provides a marking composition containing a solvent having a boiling point above 100° C. (or other working temperature which may be utilized), and which has a relatively high vapor pressure, so that the composition is maintained substantially constant, and the solvent is carried in a uniform manner into the transfer marking.

Instead of using the Butyl Carbitol which is the liquid solvent I prefer, I may also use certain equivalent substances, although Butyl Carbitol is by far the most efficient substance for this purpose. The substances which may be utilized instead of Butyl Carbitol are as follows:

Pine oil.
Diethyl oxalate.
Mono butyl tartrate.
Nitro benzol.
Carbitol-mono ethyl ether or diethylene glycol.
Butyl oxalate.

I have shown a preferred embodiment of my invention, but it is clear that numerous changes and omissions can be made without departing from its spirit.

I claim:

1. A method of making and aging transfers which consists in printing upon a paper strip, by means of a marking composition having a fusible base which is in the fused condition, said composition also containing a liquid solvent for said base, while maintaining the temperature sufficiently low to cause the printed marking upon the paper base to retain some of said solvent, and then permitting said solvent to evaporate.

2. A method of making a transfer which con-

sists in printing upon a paper strip by means of a marking composition having a fusible base which is in the fused condition, said composition also containing Butyl Carbitol, while keeping the temperature sufficiently low to cause said printed marking to retain some of said Butyl Carbitol, and then permitting said Butyl Carbitol to evaporate.

3. In a transfer having a paper strip, fusible marking imprinted on said strip, said marking having a fusible base, said base comprising a major part of Amberol and a minor part of ozokerite.

4. In a transfer having a paper strip, fusible marking imprinted on said strip, said marking having a fusible base, said base comprising a major part of Amberol and a minor part of ozokerite, and of a blown vegetable oil.

WINTHROP STANLEY LAWRENCE.

Patented Apr. 10, 1934 1,954,627

UNITED STATES PATENT OFFICE

1,954,627

PRINTING INK

Joseph F. Jirousek, Cleveland, Ohio, assignor, by direct and mesne assignments, to Mir-A-Cel Incorporated, Cleveland, Ohio, a corporation of Ohio

No Drawing. Application April 18, 1932, Serial No. 606,681

8 Claims. (Cl. 134—36)

With the customary printing inks a great loss of time is incurred in setting or drying before the further steps of cutting, folding, assembling and binding can be attended to. Efforts to ameliorate this have resulted in premature hardening of inks on the surfaces of the inking rolls, inking plates, etc., as well as filling up the depressions in half-tone forms and the like, "skinning over" in cans and inking mechanism, and difficulties in cleaning. A composition however, which can set quickly and dry rapidly and also handle and feed properly and distribute freely is thus an important desideratum and highly desired in the art.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In accordance with the present invention, I make a composition of the following ingredients and general ratio of proportions. A wax ½–¾ part by weight, and rosin oil ½ part, paraffin wax being preferable, although other waxes, as bees wax, Chinese wax, spermaceti, etc. may be used, and in some instances I may include petrolatum with the paraffin or other wax under this heading; 1–6 parts of an inorganic bodying agent (preferably dry aluminum hydrate, or in some cases chalk, magnesium oxide, etc.); 10–14 parts of a drying oil (as boiled linseed oil, or tung oil); 1–6 parts of a varnish-type resin and a low boiling cutting solvent (preferably copal for instance 8–10 per cent in alcohol or mineral spirit solvent, or in some cases amber, kauri, synthetic resins, glyptals, etc.); 6–9 parts of pigment (carbon black or desired colors, as reds, blues, greens, yellows, white, etc.); ⅛–2 parts of drier (japan, lead compounds, cobalt linoleate or resinate, manganese linoleate, resinate or borate, etc.); 1–10 parts of hydrocarbon solvent (as kerosene, varnish makers and painters naphtha, etc.); and ½–2½ parts of an organic solvent liquid of boiling point above 100° C. (preferably benzyl alcohol, or in some cases ethylene glycol mono-ethyl ether, ethylene glycol mono-ethyl ether acetate, amyl acetate, butyl acetate, amyl alcohol, butanol, and mixtures, etc.).

As an illustrative example:—A mixture is made up, employing grinding rolls for instance, comprising 30 pounds dry Royal blue pigment, 15 of heat-treated linseed oil, commonly known as thin plate oil, 6 of double-boiled linseed oil, 8 of iron blue dry pigment, 8 of petrolatum, 8½ of litho-varnish, 7 of dry purple toner pigment, ½ of kauri, 16 of alkali blue red shade in paste form, 32 of dry aluminum hydrate, 16 of rosin oil, second run, 16 of paraffin wax, 32 of cobalt drier, and 32 of kerosene. A mixture of 324 of heat-treated linseed oil, commonly known as heavy plate oil, and 128 of dry carbon black, is separately ground, and this mixture and the foregoing are then ground together, and 152 of copal varnish (9½ per cent of copal, with 35½ per cent vegetable drier and 55 per cent mineral spirits) are incorporated, and 76 of benzyl alcohol.

In the use of such compositions, immediately after the impression is made, heat should be applied, and most advantageously this may be accomplished by a suitable heater, electric, gas, etc., arranged on or adjacent the press, so that the delivered printed impression is subjected to a substantial degree of heat to complete the setting action.

Such compositions may be made up for black or for all colors for printing purposes, whether from type or by various transfer processes upon paper, cardboard, cartons, cloth, leather imitation leather, cellophane, glassine, celluloid, wood, tin, aluminum, tin-foil, and other materials that can be printed or lithographed. Such composition exhibits a superior covering power, a very thin film being sufficient to carry the requisite density, and the detail in half-tone printing and the like is sharper, with deeper perspective and clearer prints than available with customary compositions. On color work of more than one color, where each color is printed singly, the present composition will trap or superimpose regardless of the time elapsed between printings, the composition having a natural affinity for and laying particularly well upon previously printed colors. With the present composition also, the setting or drying is almost instantaneous as the printed impression is exposed to heat, thereby obviating transfer to the tympan, and work in process can be handled with great rapidity, regardless of how many colors are superimposed. As a result of the rapid throughput, changes in paper for instance due to expansion or contraction, moisture up-take, etc., can in large measure be avoided, and a more perfect register of successive colors on forms requiring such can be had, in contrast to prior difficulties in this direction. Jobs can be printed on both sides in one operation with one or

more colors on both sides of the sheet without smearing or offset, and trapping or superimposing of colors takes place without requirement of particularity relative to printing tack, and the work may proceed to the next operation, such as cutting, folding, stitching, trimming, and other bindery operations.

By reason furthermore, of a particularly hard surface finish, impressions so made do not scratch or mar readily, as is commonly the case with ordinary inks. If a press operation has to be interrupted, my composition also has an outstanding advantage of not drying or skinning over in the fountain or on the press, and cleaning may be readily accomplished.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the details described, provided the features stated in any of the following claims, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. A printing ink, comprising ½–¾ part of a wax, 1–6 parts of an inorganic bodying agent, 10–14 parts of a drying oil, 1–5 parts of a resin and low boiling solvent therefor, 6–9 parts of a pigment, ⅛–2 parts of drier, and a solvent including an organic solvent liquid constituent of boiling point above 100° C.

2. A printing ink, comprising ½–¾ part of a wax, ½ part of rosin oil, 1–6 parts of dry aluminum hydrate, 10–14 parts of a drying oil, 1–5 parts of a resin and low boiling solvent therefor, 6–9 parts of a pigment, ⅛–2 parts of drier, and a solvent including an organic solvent liquid constituent of boiling point above 100° C.

3. A printing ink, comprising ½–¾ part of a wax, ½ part of rosin oil, 1–6 parts of an inorganic bodying agent, 10–14 parts of a drying oil, 1–5 parts of a resin and low boiling solvent therefor, 6–9 parts of a pigment, ⅛–2 parts of drier, and a solvent including ½–2½ parts of benzyl alcohol.

4. A printing ink, comprising ½–¾ part of a wax, ½ part of rosin oil, 1–6 parts of an inorganic bodying agent, 10–14 parts of a drying oil, 1–5 parts of a resin and low boiling solvent therefor, 6–9, parts of a pigment, ⅛–2 parts of drier, 1–10 parts of a hydrocarbon solvent, and ½–2½ parts of benzyl alcohol.

5. In printing ink, comprising ½–¾ part of a wax, ½ part of rosin oil, 1–6 parts of dry aluminum hydrate, 10–14 parts of drying oil, 1–5 parts of copal and low boiling solvent therefor, 6–9 parts of a pigment, ⅛–2 parts of drier, and a solvent including an organic solvent liquid constituent of boiling point above 100° C.

6. A printing ink, comprising ½–¾ part of a wax, ½ part of rosin oil, 1–6 parts of dry aluminum hydrate, 10–14 parts of a drying oil, 1–5 parts of copal and low boiling solvent therefor, 6–9 parts of a pigment, ⅛–2 parts of drier, 1–10 parts of a hydrocarbon solvent, and ½–2 parts of an organic solvent liquid constituent of boiling point above 100° C.

7. A printing ink, comprising ¾ part of a wax, ½ part of rosin oil, 1 part of an inorganic bodying agent, 11 parts of a drying oil, 5 parts of a hard resin and low boiling solvent therefor, 6–9 parts of pigment, 1 part of cobalt drier, 1–10 parts of kerosene, and 2½ parts of benzyl alcohol.

8. A printing ink, comprising ¾ part of a paraffin wax, ½ part of rosin oil, 2 parts of dry aluminum hydrate, 8–12 parts of boiled linseed oil, 5 parts of copal and low boiling solvent (copal 9½ per cent with vegetable drier 35½ per cent and mineral spirits 55 per cent), 6–9 parts of pigment, 1 part of cobalt drier, 1–10 parts of kerosene, and 2½ parts of benzyl alcohol.

JOSEPH F. JIROUSEK.

A Summary of the

CHEMICAL PRODUCTS

of the

Carbide and Carbon Chemicals Corporation

SECOND EDITION
JANUARY 1, 1929

CARBIDE AND CARBON CHEMICALS CORPORATION
Carbide and Carbon Building
30 EAST 42nd STREET NEW YORK, N. Y.
Unit of Union Carbide UCC *and Carbon Corporation*

Carbitol

(Trademark)

(Diethylene Glycol Monoethyl Ether)

Specifications

Boiling Range	175-195°C. 90% distills over between 190-200°C. at 760 mm.
Initial Boiling Point	Not less than 180°C. at 760 mm.
Dry Point	Not more than 210°C. at 760 mm.
Color	Not more than 2.0 yellow (Lovibond Tintometer)
Purity	Not less than 90% Carbitol
Specific Gravity	1.021 to 1.030 at 20°/20°C.
Weight	8.5 pounds per gallon at 15.6°C.

CONTAINERS

1 gal. can	Net Content	8.5 lbs.
5 gal. drum	Net Content	40 lbs.
10 gal. drum	Net Content	80 lbs.
55 gal. drum	Net Content	425 lbs.
110 gal. drum	Net Content	850 lbs.

CARBITOL is the trademark for the monoethyl ether of Diethylene Glycol manufactured and sold by Carbide and Carbon Chemicals Corporation. It is an excellent solvent for nitrocellulose and resins and is miscible with the common diluents of lacquers. These characteristics combined with its very low rate of evaporation have brought about its use as a solvent for nitrocellulose in brushing lacquers and other industrial products.

Butyl Carbitol

(Trademark)

(Diethylene Glycol Monobutyl Ether)

Specifications

Boiling Range	Not less than 90% distills over from 222 to 232°C. at 760 mm.
Initial Boiling Point	Not less than 215°C. at 760 mm.
Dry Point	Not more than 235°C. at 760 mm.

COLOR	Not more than 2.0 yellow (Lovibond Tintometer)
SPECIFIC GRAVITY	0.962 to 0.972 at 20°/20°C.
WEIGHT	8.1 pounds per gallon at 15.6°C.

CONTAINERS

1 gal. can	Net Content	8 lbs.
5 gal. drum	Net Content	35 lbs.
10 gal. drum	Net Content	75 lbs.
55 gal. drum	Net Content	400 lbs.
110 gal. drum	Net Content	800 lbs.

BUTYL CARBITOL is the monobutyl ether of Diethylene Glycol. This compound possesses a mild odor, is soluble in water and is an excellent solvent for nitrocellulose and resins. As indicated by its boiling point Butyl Carbitol is intermediate between the "high boiling" nitrocellulose solvents and the plasticizers. In consequence it is especially useful in pyroxylin dopes and other plastics where a solvent with an extremely low rate of evaporation is required.

Ethylene Dichloride

Specifications

ACIDITY	Not more than 0.0005% calculated as HCl
BOILING RANGE	Not less than 90% distills over from 81.7 to 84.7°C. at 760 mm.
INITIAL BOILING POINT	Not less than 78°C. at 760 mm.
DRY POINT	Not more than 86°C. at 760 mm.
COLOR	Not more than 2.0 yellow (Lovibond Tintometer)
SPECIFIC GRAVITY	1.254 to 1.264 at 20°/20°C.
WATER	Not more than 0.3%
WEIGHT	10.4 pounds per gallon at 15.6°C.

CONTAINERS

1 gal. can	Net Content	10 lbs.
5 gal. drum	Net Content	45 lbs.
10 gal. drum	Net Content	90 lbs.
55 gal. drum	Net Content	500 lbs.
110 gal. drum	Net Content	1000 lbs.
Tank car	Net Content	8000 gals.

PHYSICAL PROPERTIES

	FORMULA	Molecular Weight	Specific Gravity 15°/15°C.	Boiling Point °C.	Flash Point °C.	Flash Point °F.	Solubility in 100 Grams Water at 20° C.	Vapor Pressure mm. Hg at 20° C.	Pounds per Gallon
Butyl Carbitol*	$CH_2OH.CH_2OCH_2.CH_2OC_4H_9$	162.14	0.9732	222	117	242	Completely	0.05	8.07
Butyl Cellosolve†	$CH_2OH.CH_2OC_4H_9$	118.11	0.9188	170.6	61	141	5.0	0.85	7.65
Carbitol*	$CH_2OH.CH_2OCH_2.CH_2OC_2H_5$	134.11	0.9996	198	91	201	Completely	0.13	8.32
Cellosolve†	$CH_2OH.CH_2OC_2H_5$	90.08	0.9360	134.8	40	101	Completely	4.60	7.80
Cellosolve† Acetate	$CH_3OC_2H_4.CH_2C_2H_3O_2$	132.09	0.9820^{15}	153	53	127	22.0	1.25	8.18
Methyl Cellosolve†	$CH_2OH.CH_2OCH_3$	76.06	0.9748	124.5	29	85	Completely	7.50	8.12
Diethylene Glycol	$CH_2OH.CH_2OCH_2.CH_2OH$	106.08	1.1212	245	124	255	Completely	< 0.01	9.33
Ethyl Benzene	$C_6H_5.C_2H_5$	106.08	0.8720^{20}	135	15	59	Insoluble	7.40	7.26
Ethylene Chlorhydrin 42.3%	$CH_2OH.CH_2Cl$	80.49	1.0970	96	66	150	Completely	12.50	9.13
Ethylene Dichloride	$CH_2Cl.CH_2Cl$	98.93	1.2569^{15}	83.5	14	57	0.87	78.00	10.46
Ethylene Glycol	$CH_2OH.CH_2OH$	62.04	1.1166	197.2	111	232	Completely	0.09	9.30
Triethanolamine	$(CH_2OH.CH_2)_3N$	149.12	1.1240^{15}	277-279 @ 150 mm	185	365	Completely	< 0.01	9.36

* *Carbitol is the Trademark for the Monoethyl Ether of Diethylene Glycol, Manufactured and Sold by Carbide and Carbon Chemicals Corporation.*

† *Cellosolve is the Trademark for the Monoethyl Ether of Ethylene Glycol, Manufactured and Sold by Carbide and Carbon Chemicals Corporation.*

"Custom Built" Solvents

METHYL CELLOSOLVE ★
CELLOSOLVE ★
CELLOSOLVE ★ ACETATE
BUTYL CELLOSOLVE ★
METHYL CARBITOL ★
CARBITOL ★
BUTYL CARBITOL ★

THESE MATERIALS are the first of a series of solvents that have been "custom built" in our laboratories to specifications set up by the chemical industry.

With boiling points ranging from 124°C to 222°C, with a great variety of solvent properties and with varying degrees of water solubility, these solvents have acquired a wide scope of usefulness as indicated by the following few examples:

Solvents in Cellulose Nitrate and Acetate Lacquers
Adhesive for moisture-proof Cellophane
Dye Solvents in Printing and Vat Dyeing
Coupling Agent in Soluble Oils
Laminated Glass
Dry Cleaning
Cosmetics

Our Technical Department is in a position to apply these solvents to your needs. Your inquiry on the application of these compounds to your problems will receive prompt attention. Address

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CELLOSOLVE ★
CELLOSOLVE ★ ACETATE
DICHLORETHYL ETHER
DIETHYLENE GLYCOL
DIOXAN
ETHYLENE DICHLORIDE
ETHYLENE GLYCOL
ETHYLENE OXIDE
ISOPROPANOL
ISOPROPYL ETHER
METHYL CARBITOL ★
METHYL CELLOSOLVE ★
METHANOL
PROPYLENE DICHLORIDE
PROPYLENE GLYCOL
PROPYLENE OXIDE
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VINYL CHLORIDE
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CARBIDE AND CARBON CHEMICALS CORPORATION
30 East 42nd Street, New York
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Unit of Union Carbide and Carbon Corporation

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New York, N. Y.

Please send me further information about your _____ (Name of product)

Name _____
Company _____
Street _____
City _____ State _____

Plastic Printing Inks for Rapid Drying

By M. E. Hanson*

(Concluded from Last Month)

The ozone generators consume very little power and are well worked out but are very expensive, both as to first cost and upkeep. The apparatus for applying cooled ozone to the heated inked surface, though fairly well worked out, is complicated and seriously fills up the all-to-little press space.

Three or four manufacturers have developed varnish vehicles of this general character for all colors, advertising them as heat and ozone reactive inks. Printing with them and using heat and ozone as high as 60 impressions per minute have been obtained, the ink drying in about two seconds, being dry before it reached the folding devices. It probably will be possible to greatly increase the number of impressions per minute but there always will be that intransmutable time element present while the ink is absorbing oxygen and consequently considerable more space and length of web will be required between the first impressions and those on the reverse side of the folder. Too, it has been found that heat and ozone can readily be buried in the stack when no folder is used by applying heat and ozone in more moderate forms to the surface of the running sheet. Drying is sufficient to set the ink enough so that no slip sheets are required, the whole stack being dry in a few minutes. With the ordinary inks employing no heat or ozone, the drying time was 8 to 10 hours and slip sheets were required.

It is clear that an ink capable of drying into a hard film without necessarily absorbing any oxygen is most desirable. Thus we develop a general characteristic for a plastic ink, namely one that will not dry in a thin film exposed to room air at 80° F. for several hours, as it might be spread upon rolls or plates, but merely at a touch of heat after being printed upon the paper dries almost instantly.

We find many plastic substances which dry or harden with little or no absorption of oxygen. Their hardening takes place when heat is applied to evaporate the thinners or solvents used when compounding the constituent elements. When we make measurements of the heat required for drying we find that more heat had to be used than is theoretically necessary to drive off or evaporate the known weight of solvents present. Why is this extra heat required? Delving more into theory, we find two probable reactions taking place which employ this extra heat as the motive force. One reaction is that when the solvent leaves the plastic substances, molecules of the solvent have to be torn away from molecules of plastic, and as there is an electrical attraction between them, energy is required to accomplish the separation. This leaves the molecules of plastic with an unsatisfied electrical charge. As the solvent thins out, molecules of the plastic substances come closer together. As they become packed sufficiently close the unsatisfied electrical charges, some negative or lower in potentiality to the positive charges of others, cause a natural selection of opposite electrical attraction between the plastic molecules. An entirely new arrangement takes place. If it were not for friction of some sort the transition would take place with the speed of an electrical discharge or the speed of light. The second employment for the extra heat is to aid the electrical attraction to overcome this friction more speedily. Thus we have reactions entering into the drying and hardening of a plastic film that naturally take place quickly.

One thing we must learn to do is to control these reactions in various ways. This may be done by varying chemical mixtures used, choice of different solvents, use of inerdents, measure and degree of plasticizing, etc., to get the right degree of "tack," the right viscous body, the right mechanical balance between different colors, all according to different printers' specifications. This control must be simply worked out to meet ready and accurate use in the ink room.

The solvents available have different boiling points ranging through a broad scale, but unfortunately for this problem their vapor pressure curves are nearly parallel. If we choose one from the group with a boiling point well under 210° F., the highest practical heat to apply to a printed sheet, we find that at room temperature its vapor pressure is still so great that drying will progress rapidly. On the other hand, if one is selected with a vapor pressure so low at room temperature that little drying takes place, at 200° to 210° F., we find the boiling point hardly attained or not even reached.

If we could only flatten the curve of a high boiling solvent with a vapor pressure of 1 in. of mercury or less at 80° down to a point where at 30 in. the boiling temperature would be reduced to only 150° or so it would not take us long to compound an ink to meet the general characteristics for a plastic ink set forth above.

Our problem becomes one to get the effect by indirect means. There is little obtainable information as to the sums of the partial pressures of mixtures of two or more solvents but it is certain that they do not closely follow direct proportional rules and some very odd results obtain. The drying result can be further affected by the kind, number and method synthesizing the combination of plastic gums present, the degree to which they have been worked, milled or agitated, the amount and kind of solvents employed and the temperatures and pressures to which the whole or parts are subjected during process of manufacture. This opens up a nine-tenths unexplored field of research. Further, there are inerdents and also catalytic chemicals serviceable to produce varying effects. Certain it is there are many combinations which will produce a desirable ink vehicle where there are so many elements and combinations to draw from.

The general characteristic for a plastic ink vehicle develops into a preliminary specification as follows:

1. One not hardening on rolls, plates or in fountains at room temperatures even if press is stopped for several hours.
2. One which heated on the printed sheet to not over 210° F. will harden or dry in a small fraction of a second.
3. One having no great amount of solvent present.
4. One thickening very slowly in fountains if at all.
5. One suitable for milling into it powdered colors under ordinary ink room conditions.
6. One when even dry on plates or rolls may be washed off easily with a cheap and inoffensive solvent.
7. One possessing no inerdients fire hazard.
8. One, white as a vehicle, is nearly water white.
9. One capable of being furnished in several body weights or degrees of "tack."
10. One that will not deteriorate glue or soft rubber inking rolls.
11. One capable of long storage in the can without deterioration.
12. One drying with a good body and brilliancy.

Little interest has been shown in plastic inks until the last twelve months. Since then a great deal has been done. Previous to that time samples have been made or formulas suggested by one chemist or another for fast-drying ink plastics.

Continued on page 31

*Mechanical and Chemical Engineer, Collingswood, N. J. Member American Society of Mechanical Engineers.

Plastic Printing Inks for Rapid Drying

Continued from page 9

The first remembered were samples made by chemists working on light-weight paints for painting airplane wings during the war. Cotton, camphor, celluloid, rubber, paper, wool and even straw were some of the ingredients. They were inexpensive and lasting enough for an ink but they all were of a type which dried too quickly in the fountains and on the rolls and plates. Recently, however, samples from several manufacturers have shown enough improvement in this respect to make a pretty good ink. Solvents, too, have been so greatly reduced as to prove no serious objection in the pressroom.

One manufacturer has presented an ink capable of drying with a very brief exposure to heat which will remain moist on inking rolls and plates for a long time. There are many points to be worked out concerning its use as a commercial ink for magazines or newspapers. It gives great promise, however, there being little doubt as to its ultimate success if the necessary work upon it is persistently carried on to a finish. Others are close behind.

The use of such an ink when perfected will eliminated wax sprays, slip sheets or offset paper rolls for multi-color commercial printing. It will be less expensive and save in addition many considerable factors in manufacture and cost of production. It will make possible newspapers printed in multi-color daily as cheaply as those which are now printed in black. There will be no trouble with registry upon a color cylinder. As these inks can be dried in a foot or two of web length, colors may be applied immediately on the reverse side and go directly to the folding devices at present press speeds. Some very fine pictures and advertising illustrations have been experimentally produced in colors on regular newspaper stock. If desired, the rough, porous nature of the paper can be taken care of just under the picture only by means of a rapid-drying printed ground color film. The ground coat is required only when particularly fine illustrations are required, like the reproduction of an oil painting for example.

It is safe to predict for the very near future newspaper colored back-page advertising of a high-class type comparable with our good magazines.

As we emerge shortly from this present state of depressed business we will find many changes in the order of things. One of the changes will be an increased use for advertising in selling. Good illustrations are far more effective than high-sounding descriptive phrases. The newspaper can fill a need never reached by the magazines. They need not be viewed as competitors in any sense. Magazines are national mediums and newspapers are strictly local mediums with few exceptions. There is no reason at all why newspapers should not find good illustrative advertising in colors profitable.

Edward J. Volz

Continued from page 8

and has encouraged the establishment of unemployment benefit systems by local unions.

By virtue of his office he is a member of the board of governors of the International Allied Printing Trades Association composed of the executive officers of the five major international printing trades' unions; member of advisory committee (representing American Federation of Labor) of prison industry and wages; chairman committee on banking and Insurance, New York State Federation of Labor; chairman committee on insurance, Central Trades and Labor Council of New York City; member of advisory committee, Federation (Labor) Bank & Trust Company of New York City, and a member of the advisory committee, Union Labor Life Insurance Company.

Burgess Chrome Mats

A Laboratory Product

OUTSTANDING

IN QUALITY • A firm bodied, practically non-porous mat, constructed of the highest quality materials, producing unquestionably the finest printing stereotype plates.

IN SERVICE • Our representatives are seasoned, experienced practical men—able and willing to assist you at all times to alleviate or eliminate your stereotyping troubles. Their services are yours for the asking.

IN PRICE • We quote as low a price as is commensurate with quality and good business practice. Our prices are published, the same to one and all, having no special discounts for cash, quantity purchases or contracts. A fair and square deal for all is our policy.

Our claim to your patronage rests on our ability to maintain the above to your entire satisfaction.

BURGESS CELLULOSE COMPANY

Division of C. F. Burgess Laboratories, Inc.

Freeport, Illinois

Defendant's Exhibit N-2.

Wood et al U. S. Patent No. 1,261,885.

Brunell U. S. Patent No. 1,592,806.

Brunell U. S. Patent No. 1,665,185.

Ullstein British Patent No. 249,472.

(Opposite ☞)

J. WOOD & W. ARMSTRONG.

APPARATUS FOR PRINTING MAGAZINES AND SUCH LIKE WORK.

APPLICATION FILED FEB. 18, 1915.

1,261,885.

Patented Apr. 9, 1918.

2 SHEETS—SHEET 1.

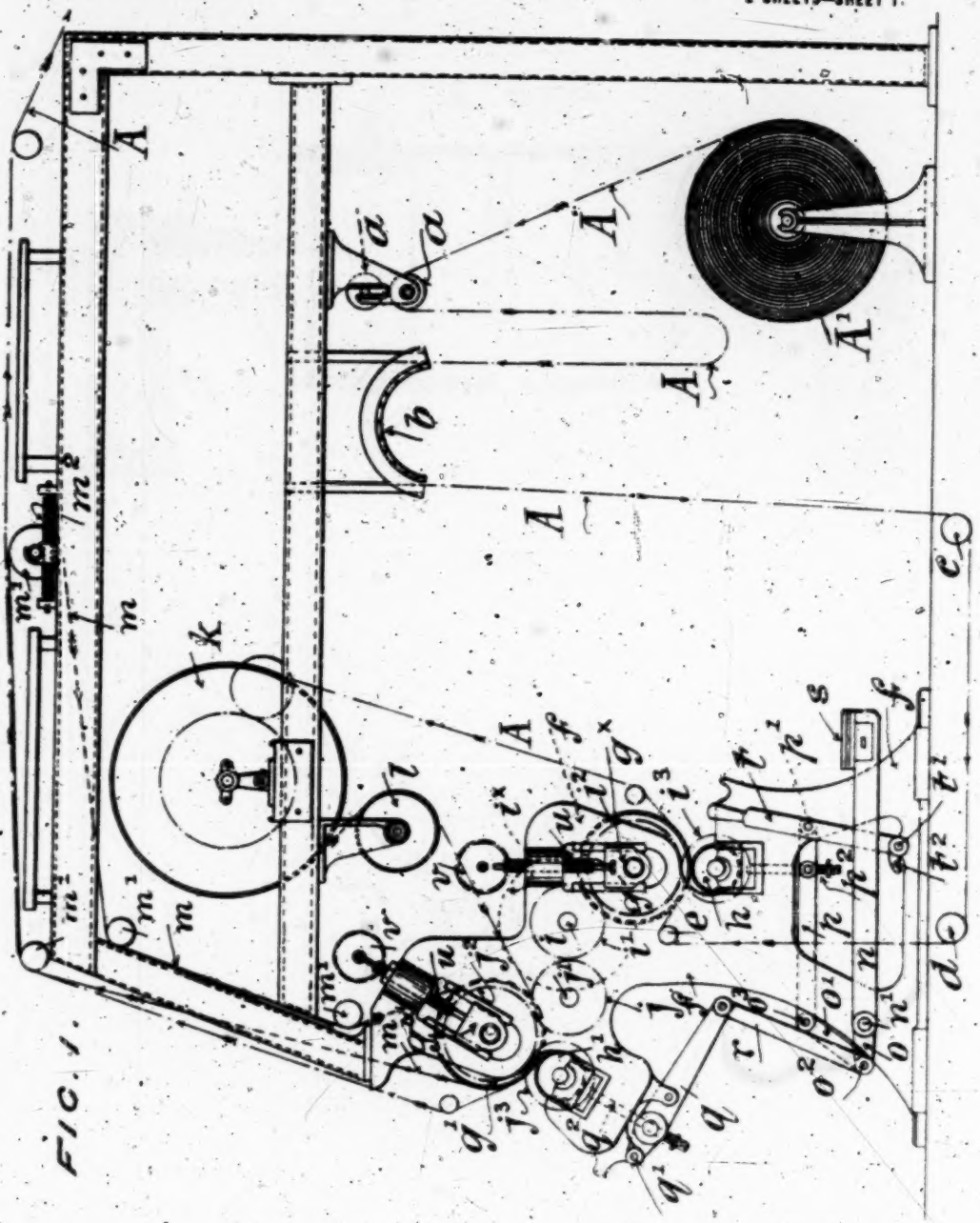


FIG. 1.

WITNESSES:

John C. Sanders

Albert F. Neuman

INVENTORS:

John Wood

& William Armstrong

Wm. Wall & Wall

ATTYS

J. WOOD & W. ARMSTRONG.

APPARATUS FOR PRINTING MAGAZINES AND SUCH LIKE WORK.

APPLICATION FILED FEB. 16, 1915.

1,261,885.

Patented Apr. 9, 1918.

2 SHEETS—SHEET 2.

FIG. 2.

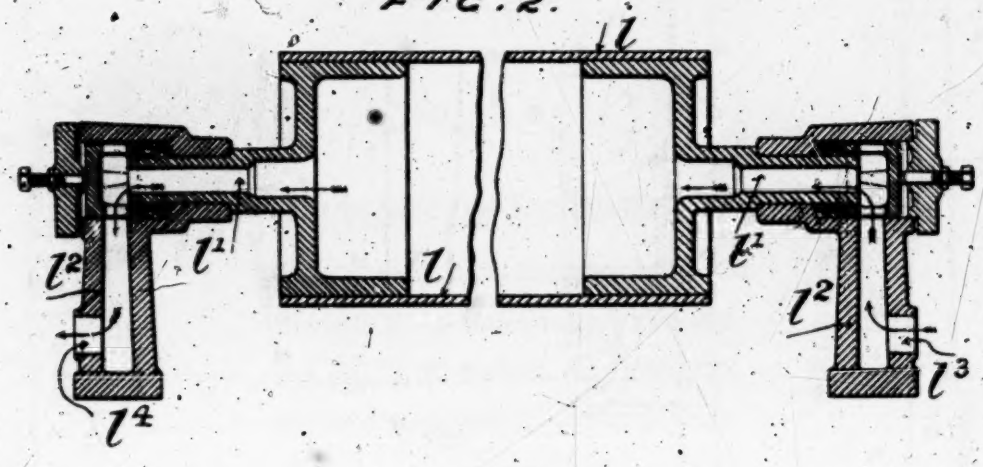
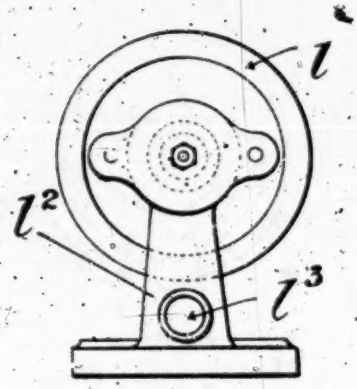


FIG. 3.



WITNESSES:

John C. Sanders

Albert F. Heumann

INVENTORS:

John Wood

William Armstrong

BY Wallace Mick

ATTY

UNITED STATES PATENT OFFICE.

JOHN WOOD AND WILLIAM ARMSTRONG, OF RAMSBOTTOM, ENGLAND.

APPARATUS FOR PRINTING MAGAZINES AND SUCH LIKE WORK.

1,261,885. Specification of Letters Patent. Patented Apr. 9, 1918.

Application filed February 16, 1915. Serial No. 8,498.

To all whom it may concern:

Be it known that we, JOHN WOOD and WILLIAM ARMSTRONG, subjects of the King of Great Britain and Ireland, residing at Garden Engineering Works, Ramsbottom, in the county of Lancaster, England, have invented new and useful Improvements in Apparatus for Printing Magazines, and Such like Work, of which the following is a specification.

This invention relates to a machine or apparatus for photogravure or intaglio printing whereby reproductions by photogravure processes can be obtained and printed on one but usually on both sides of a passing web. Such processes are at present in use and need not be dealt with here, it being sufficient to say that two separate printing arrangements have been utilized necessitating the paper traveling to some considerable extent in horizontal paths or paths inclined to the horizontal.

The object of our invention is to obtain an extremely compact machine or apparatus for our purpose by combining in the one head or printing mechanism proper, both the two backing bowls and the two printing cylinders or rollers so that the same are adjacent to each other and located at one end of the apparatus. In effect we use according to our system a duplex printing arrangement and have all the parts combined and grouped at one head and whereby the paper can pass to and fro in more or less vertical or inclined paths instead of having horizontal or approximately horizontal travel.

In the machine or plant we prefer to employ a fluid cooled roller or rollers for cooling the passing web or paper, which is an important feature in our proposed apparatus for duplex photogravure printing.

We also arrange to so carry the printing cylinders or rollers that same can be simultaneously adjusted or moved with respect to the backing bowls over which the paper passes to be printed, or, alternatively, we arrange to adjust the backing bowls to the printing cylinders or rollers.

We will now proceed to clearly indicate the invention by a full description of one form of printing machine which will carry out our object, and which combines the features of novelty above indicated, and, in this description, the attached drawings will be referred to.

In the said drawings:

Figure 1 shows a general side elevation of a single color duplex or perfecter photogravure printing machine of the type and possessing the features indicated in the preamble.

Fig. 2 is a detail section of a water cooled roller which we prefer to employ.

Fig. 3 is an end view of Fig. 2.

Referring in particular to the construction illustrated generally in the attached drawing, we take the paper A to be printed from a batch or reel such as A′ at one end of the apparatus and lead same upward to drawing rollers *a a* or such like, then down if necessary and over a saddle such as is marked *b*. From the saddle, the paper A preferably passes downward to a roller *c* and from thence it may pass in a horizontal direction and over rollers *d e* toward the printing mechanism to which it preferably passes upward from below. The actual printing combination comprises end frames *f f* in which are carried two sets of backing bowls and printing cylinders or rollers, that is, a backing bowl and printing roller for each side of the paper. The backing bowl in the first set is marked *g* and the printing cylinder or roller *h*, while the backing bowl of the second set is marked *g′* and the printing cylinder or roller *h′*. As shown, the two sets lie adjacent and are interconnected for driving and other purposes and this is preferably done by spur wheels on shafts or studs carried by the end frames. The driving arrangement illustrated is a very simple one, and, consists of a main driving shaft *i* having a spur wheel *i′*, said shaft having fast and loose pulleys *i²* or being driven by gear. The spur wheel *i′* gears with a crown or spur wheel *i³* on the first impression bowl shaft and this wheel *i³* meshes with a spur wheel *i⁴* on the first printing cylinder or roller *h* as is clearly shown. On the left of the spur wheel *i* is an intermediate spur wheel *j* on the stud or other shaft *j′*, and this intermediate spur wheel *j* gears into the crown or spur wheel *j²* on the second backing bowl shaft, which crown or spur wheel *j²* gears into and drives the spur wheel *j³* on the second printing cylinder or roller *h′*.

The ascending paper A traveling over the roll *e* passes between the first backing bowl *g* and printing roller *h* and is printed as to one face, and then goes upward and

travels around a revolving steam heated or drying cylinder such for example as the copper drying cylinder *k*. After passing around such cylinder, the paper is guided around a provided cooling device and preferably is caused to contact with a revoluble water cooled roller *l* which contains water or has cooling liquid circulated therethrough. Such roller is very clearly illustrated in detail by Figs. 2 and 3 of the drawings. The hollow shafts *l'* *l'* are supported by hollow brackets l^2 l^2, said shafts being properly packed by packing and glands as shown.

Water or cooling liquid enters at l^3, passes through the hollow roller *l* and leaves at the outlet l^4.

This roller *l* effects cooling of the paper, and, from that, the paper passes between the second backing bowl *g'* and the second printing cylinder or roller *h'*. The drying cylinder and water cooled roller or rollers are most conveniently situated immediately above the duplex printing mechanism, as the drawing shows, and can be easily supported by girders or framework. In connection with the second backing or impression bowl *g'* we use a traveling backing blanket *m* which passes over suitable guide rollers *m'* and is kept sufficiently taut by the tension device m^3.

After leaving the second printing elements, the paper is led upward over guide rollers and passes across suitable drying sheets, chests, or the like to the cutting machine.

In order to have proper control over the printing mechanism we find it necessary to provide means to adjust or move the printing cylinders or rollers and attendant parts and with this object in view we may use lever and link mechanism of a form which will give simultaneous adjustment of the two printing cylinders or rollers *h*, *h'*. The form of lever and link mechanism shown in the drawing consists of a strong lower horizontal lever *n* fulcrumed at *n'* on a shaft supported in the frame and having short extension levers *o* to which links *o'* are connected at o^2, these links *o'* being jointed at o^3 to second levers *p* pivoted to the frame at *p'* and which levers *p* have a nut and screwed spindles p^2, which latter act on the bearing blocks of the first printing cylinder or roller *h*, and so movement of the levers *p* effects movement of the first printing cylinder or roller *h*. To similarly influence the second printing cylinder or roller *h'*, we also utilize additional inclined or other levers *q* fulcrumed at *q'* and such levers carry nuts for screwed adjusting spindles q^2 which act on the bearing blocks of the second printing cylinder or roller *h'*. The levers *q* are acted on and connected by links *r* jointed to the short extensions *o* influenced by the lower horizontal lever *n*. Adjustable weights *s* on this lower horizontal lever *n* keep the printing cylinders or rollers up to their work. To effect simultaneous lowering or adjustment of the printing cylinders or rollers we provide a hand lever *t* pivoted at *t'* and having a cam t^2, which cam acts on the lower horizontal lever *n* and raises the weighted end. It will be quite understood from the preceding description of the lever and link mechanism that the requisite levers and links are duplicated at the other end of the machine supported by the frame and connected across as necessary.

Instead of the above described arrangement, or in addition thereto, we may arrange to be able to raise or lower the backing bows *g*, *g'*. We show an obvious way of doing this according to which the backing bowls are carried in adjustable bearings g^x g'^x to which screwed spindles *u* *u* are fitted and which work in the frame. Said screwed spindles are actuated by bevel gear *v*, *v*, as indicated, and the two sets of gear may be interconnected so that adjustment of both bowls could take place simultaneously.

By directing the paper up and down, sagging does not take place, and correct "register" is insured.

The whole construction makes for extreme compactness and efficiency and the entire printing mechanism is localized at one point.

In case it is found that the ink can be dried very rapidly we may in some cases arrange to convey the paper after it has been printed by the first printing cylinder directly across to the second printing cylinder without requiring to take the paper around the drying cylinder as hereinbefore described.

We declare that what we claim is:

1. A duplex or perfecter photogravure or like printing machine comprising a single head, single end frames, two impression bowls located in the one head, adjusting means for the bowls, two printing cylinders in the one head and mounted below the bowls, lever and link mechanism to simultaneously move both printing cylinders, a paper supply source, guiding rollers for the paper, a stationary saddle, a drying cylinder arranged above the impression bowls, a water cooling cylinder arranged between the drying cylinder and the impression bowls, and a positive driving connection between the impression bowls.

2. A duplex or perfecter photogravure or like printing machine comprising a batch supporting means, draw rollers, a saddle, and guide rolls in combination with end frames supporting two impression bowls, printing cylinders below the bowls, sup-

ports therefor, adjusting devices for the cylinders comprising lever mechanism, a drying roller and additional guide rollers and a water cooled roller through which water is caused to flow, all in combination, and for the purpose set forth.

3. A duplex or perfecter photogravure or like printing machine comprising a single head, single end frames, two impression bowls supported by said end frames one above the other in relatively close relation, a positive drive connection between the bowls, two printing cylinders arranged one above the other for coöperation with the under surfaces of the impression bowls, means to movably support the cylinders, means for guiding the paper, and means for simultaneously adjusting both printing cylinders with relation to the impression bowls comprising a horizontal lever, a shaft on which the lever is fulcrumed, other levers having linked connection with the aforesaid shaft and also having operative connection with the lowermost printing cylinder supporting means, an operating lever to actuate the first mentioned lever to raise and lower the lowermost printing cylinder, and link and lever connections between the first mentioned lever and the supporting means of the uppermost printing cylinder, whereby upon actuation of the operating lever both of the printing cylinders may be raised and lowered toward and away from the under surfaces of the impression bowls.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN WOOD.
WILLIAM ARMSTRONG.

Witnesses:
ERNALD SIMPSON MOSELEY,
NORMAN KIERNAN.

July 13, 1926. 1,592,806

L. W. BRUNELL

ART OF PRINTING

Filed June 16, 1924 2 Sheets-Sheet 2

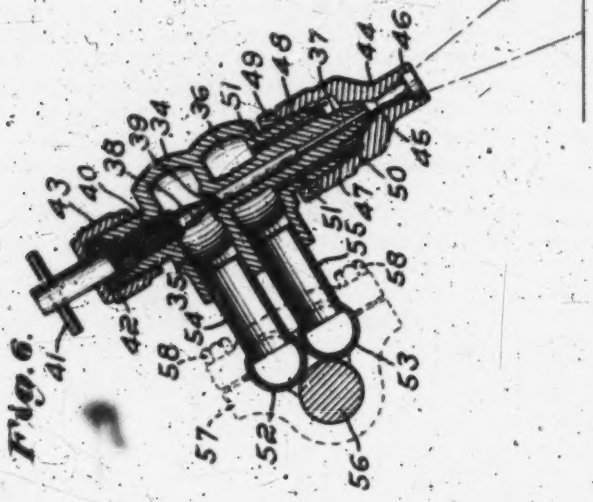


Fig. 6.

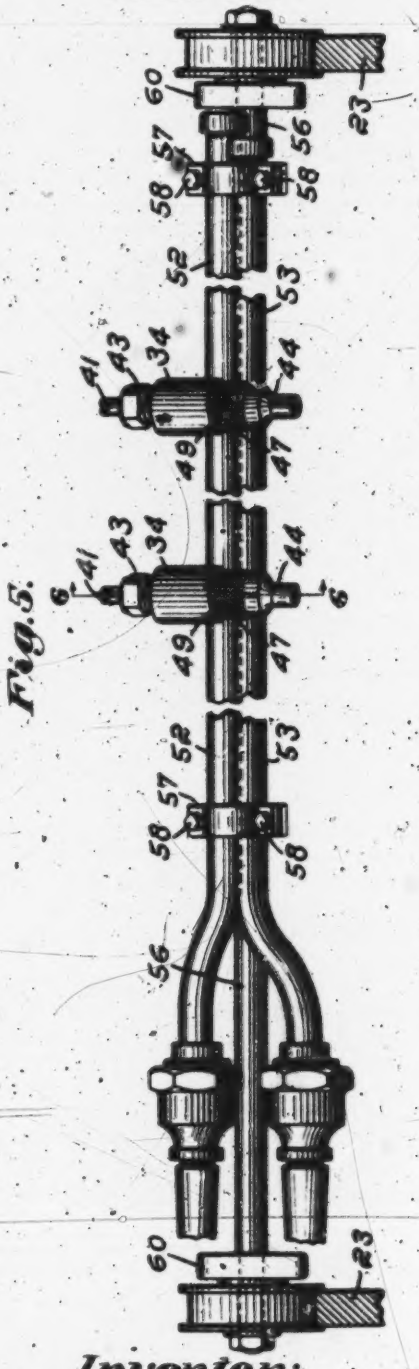


Fig. 5.

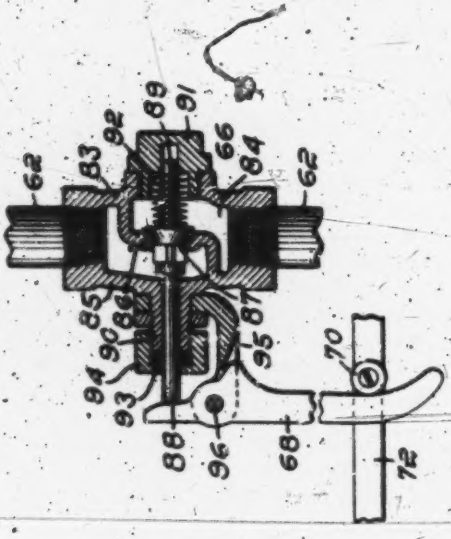


Fig. 4.

Inventor:
Leo W. Brunell,
by Emery Booth, Janney & Varney
Attys.

July 13, 1926. 1,592,806

L. W. BRUNELL

ART OF PRINTING

Filed June 16, 1924 2 Sheets-Sheet 1

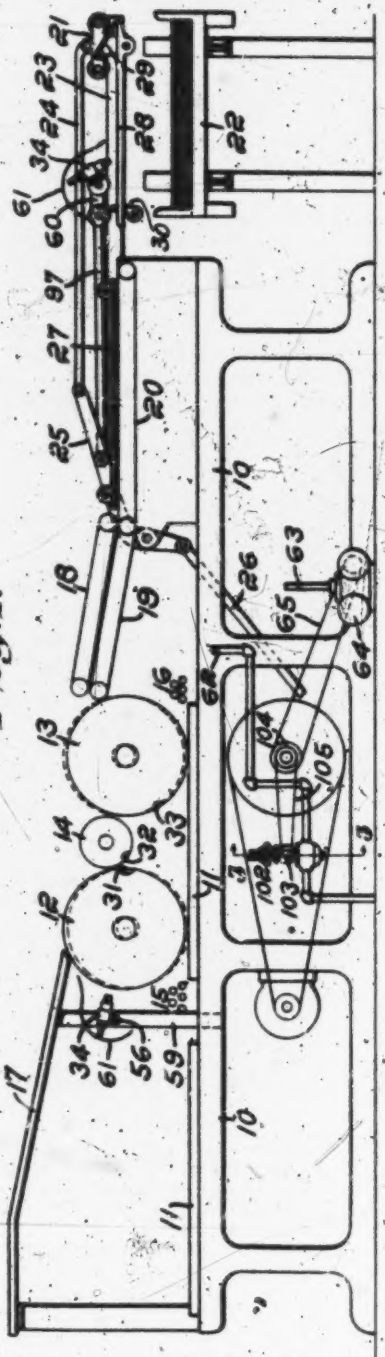


Fig. 1.

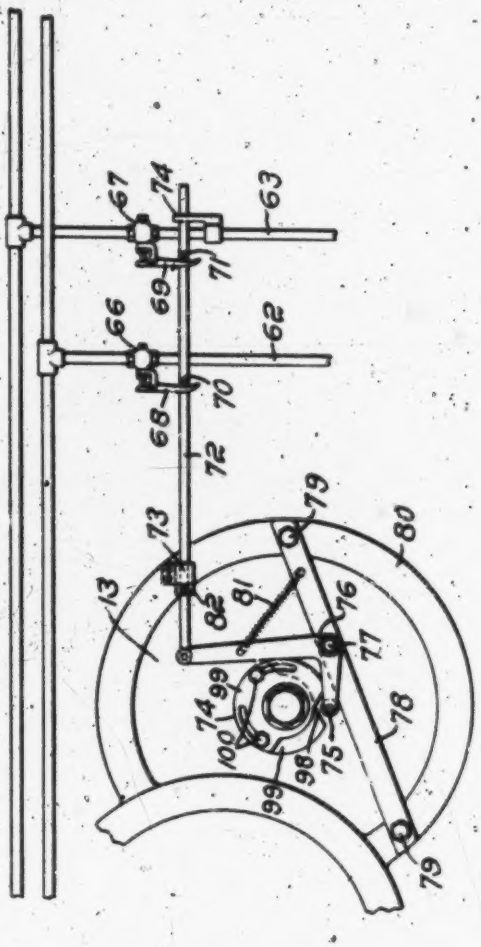


Fig. 2.

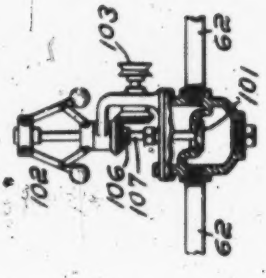


Fig. 3.

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Patented July 13, 1926. 1,592,806

UNITED STATES PATENT OFFICE.

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ART OF PRINTING.

Application filed June 16, 1924. Serial No. 720,149.

This invention relates to the art of printing, and aims to provide a novel and improved method of and means for treating freshly printed sheets to dry the same, and to eliminate static charge therefrom.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment by which the method may be carried out, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a skeletonized, conventional representation of a two-color printing press equipped with means for carrying out the method, some of the parts of my apparatus, however, being omitted for the sake of clearness, and because of the small scale of the view;

Fig. 2 is an elevation, on an enlarged scale, of the parts omitted from Fig. 1;

Fig. 3 is a sectional view on an enlarged scale on line 3—3 of Fig. 1, showing the fuel controlling valve which is responsive to the speed of the press;

Fig. 4 is a vertical, sectional view on an enlarged scale of the fuel controlling valve, which is synchronized with the press to furnish maximum and minimum amounts of fuel at different times in the cycle of the press;

Fig. 5 is a front elevation of some of the burners, their mounting, and the air and fuel supply conduits, on an enlarged scale; and

Fig. 6 is a sectional view, on an enlarged scale, on line 6—6 of Fig. 5.

Referring to the drawings, and to the embodiment of the invention which is selected for exemplification, there is shown a two-color press of common form, having a frame 10, a type bed 11, impression cylinders 12 and 13, a transfer cylinder 14, two sets of inking rollers 15 and 16, a feed table 17, and delivery mechanism including two sets of upper and lower feed tapes 18 and 19, another set of feed tapes 20, to which the tapes 18 and 19 deliver the sheets, and a reciprocating carriage 21, which receives the sheets from the tapes 20 and delivers them one by one onto a lowering table 22. The carriage is supported by rails 23, and is reciprocated by mechanism including links 24, levers 25, and links 26, the latter being actuated by a usual crank mechanism not shown. When the sheet is travelling along the tapes 20, it is guided by guides 27, which keep it flat, and it is taken from the tapes by supports 28 carried by the carriage, which also carries movable stops 29 for the front edge of the sheet. The rear edge is positioned by swinging arms 30, which are lowered at the moment that the sheet strikes the stops 29, and are raised afterward to prevent the sheet from travelling backward.

The sheets are fed one by one from the feed table 17 to the first impression cylinder, and the sheet is seized by grippers 31. The cylinder makes one full revolution to wrap the sheet about the cylinder, and then during the next revolution, when the leading edge of the sheet is adjacent the first set of color plates carried by the bed, the cylinder is lowered and the first impression is made. The sheet is then carried to and seized by grippers 32 carried by the transfer cylinder, and is carried to and seized by grippers 33 carried by the second impression cylinder. The second impression is then made by the lowering of the second cylinder to bring the sheet into contact with the second set of plates carried by the bed, after which the sheet is delivered to the tapes 18 and 19, whence it passes along the tapes 20 and onto the guides 28, which at that moment are positioned to receive the same. The forward movement of the sheet brings it against the stops 29, and the carriage starts forward, bringing the sheet into position above the lowering table 22. The arms 30 then swing into place, and prevent backward movement of the sheet during the backward movement of the carriage which now takes place, at which time the front stops 29 lift and allow the sheet to pass off the guides 28 onto the lowering table.

The present invention contemplates the use of flame directed onto the printed face of the sheet at one or more points during the travel through the press, thereby to dry, or more properly crystalize, the ink, and to eliminate static charge from the sheet. In the present example, flame is employed at two points, namely: first, at the first impression cylinder shortly following completion of the first impression, and second, as the sheet is being delivered onto the lowering

table. At each of these points, there are several burners, one of which is shown in Fig. 6. The burner in its preferred form comprises a casing 34, presenting an air inlet chamber 35 and a fuel inlet chamber 36. Communicating with the air inlet chamber is an air nozzle 37, to which air is supplied under the control of appropriate valve means, herein a needle valve 38 cooperating with a seat 39, and having a stem 40 threaded into the casing 34, the outer end of the stem presenting a handle 41. Leakage of air about the stem is prevented by a packing ring 42 and gland 43, the latter being adjustably threaded onto the casing 34. By means of this valve, the proportion of air to the fuel may be varied at will.

Associated with the air nozzle and in the present example disposed about the latter is a fuel nozzle 44, having a contracted throat 45 adjacent the outlet of the air nozzle 37. Outwardly beyond this throat, the outlet is widened, and terminates in an annular groove 46, which prevents the flame from being accidentally extinguished when it is burning at minimum intensity. Adjustment of the fuel supply nozzle to vary the fuel output may be effected by moving the same axially with relation to the air supply nozzle, this being conveniently accomplished in the present example by providing the fuel nozzle with a sleeve 47 threaded on and about a nipple 48 presented by the casing 34. A lock-nut 49, also threaded onto the nipple, serves to maintain the adjustment of the fuel nozzle. Inwardly beyond the throat 45, the fuel nozzle presents a chamber 50, to which fuel is supplied from the chamber 36 through one or more, herein a plurality of, passages 51, two of which are shown in Fig. 5. Thus it will be seen that by the use of these adjustments, the amount and the relative proportions of air and fuel may be varied at will. In practice, the burners are rather closely placed, so that the flames which they project form a continuous sheet of flame from one edge of the paper to the other.

Air and fuel are supplied to the burners by supply pipes 52 and 53, extending transversely of the press and having branches 54 and 55 (see Fig. 6) at intervals leading into the chambers 35 and 36, respectively. These supply pipes in the present example are supported on a transverse rod 56, to which they are appropriately secured, as by clamping collars 57 provided with clamping screws 58. By this means, the burners may be adjusted bodily, both longitudinally of and radially about the axis of the supporting rod, thereby to position the entire group of burners properly with relation to the edges of the paper, and to present the burners at the best angle to the surface of the paper. In the case of the burners associated with the first impression cylinder, the supporting rod is conveniently mounted on uprights 59 (see Fig. 1), while in the case of the burners adjacent the lowering table, the supporting rod is mounted on a carriage 60 (see Fig. 5), which runs on the same rails 23 which support the carriage 21. To conserve heat, there may be associated with each set of burners a shield or hood 61, whose internal surface may, if desired, be polished or otherwise treated to present a reflector.

The fuel, such as common illuminating gas, is supplied to the two sets of burners by a common supply pipe 62 (see Fig. 2), while the air is supplied to both sets of burners by a common supply pipe 63, the latter being connected to and supplied by a blower 64, appropriately driven by the press as by a chain or belt 65. While the blower might be driven by a separate source of power, it is preferred to have it driven by the press itself, so that when the press is stopped, the supply of air will cease, and the flame will therefore be reduced.

The gas and air supply pipes 62 and 63 are controlled by automatically operated valves 66 and 67, both of which are controlled by and operate in timed relation to the press, so as to produce a maximum flame at each set of burners, just as the sheet is passing by, and to produce a minimum flame when no sheet is passing. To this end, the valves are provided with actuating levers 68 and 69 cooperating with rollers 70 and 71 carried by an operating rod 72 extending longitudinally of the press, and mounted to slide in appropriate guides 73 and 74. This rod is operated by a suitable part of the press, such as the second impression cylinder 13, which, as shown in Fig. 2 carries a cam 74 cooperating with a wiper, herein a roller 75 carried by one arm of a lever 76, whose other arm is pivotally connected to the rod 72. This lever is conveniently fulcrumed on a pivot 77 on a bar 78, whose ends are secured, as by screws 79, to a usual gear casing or guard 80 for the gear (not shown), which drives the cylinder. A spring 81, herein attached at one end to the lever and at its other end to the supporting bar, constantly tends to maintain the roller in contact with the cam, and to move the rollers 70 and 71 out of engagement with their respective valve operating levers 68 and 69. In the case of the air controlling valve, it is desirable that the valve shall be completely closed when no sheet is travelling past the burners, and to that end, the roller 71, as shown in Fig. 2, at such time clears the lever 69, which it actuates. In the case of the gas valve, however, it is desirable that the same shall remain partly open, thereby to maintain a low flame, except at such times as a sheet is actually passing the burners.

One convenient way of accomplishing this is to provide the actuating rod 72 with a stop collar 82, adapted to engage the guide 73, and thus limit the movement of the rod toward the right, under the influence of the spring. In this way, the roller 70 carried by the rod, cooperating with the lever 68, prevents the gas valve from closing entirely.

One convenient form of valve for the gas and air supplies will now be described, reference being had to Fig. 4, which shows the gas valve. This valve comprises a casing 83, presenting inlet and outlet chambers 84 and 85, and an intervening seat 86 for a valve 87 having oppositely projecting stems 88 and 89, one guided by a threaded nipple 90 presented by the valve casing, and the other guided by a cap 91 threaded into the casing. A spring 92, encircling the stem 89 and bearing at one end against the valve and at its other end against the cap, tends to seat the valve, which however, as previously stated, is normally held slightly open. Leakage of gas about the stem 88 is prevented by a packing ring 93 and a gland 94, the latter being threaded onto the nipple 90, which also affords a convenient support for a bracket 95, on which the lever 68 is fulcrumed on a pivot 96. The air valve, being of the same construction, though normally entirely closed, is not shown in detail.

The operation of the machine as thus far described will be reviewed briefly, reference being had to Figs. 1 and 2. The sheet to be printed is fed from the feed board to the grippers of the first impression cylinder, which makes one full revolution to wrap the sheet about the cylinder, and then, during the next revolution, when the leading edge of the sheet is adjacent the first set of color plates, the cylinder is lowered to bring the sheet in contact with the plates, thus making the first impression. When the leading edge of the sheet reaches a point adjacent the first set of burners, the automatically operated valves cause air and gas to be supplied to operate the burners at maximum capacity. At this point, it may be mentioned that, with the particular press selected for illustration, it happens that a sheet is being carried past the second set, and it follows that a single set of controls suffices for both sets of valves.

While the flames are of sufficient intensity to ignite the sheets if the latter were not moved at a sufficient speed, yet the surface speed of an ordinary press is ample to prevent the sheet from being scorched ever so slightly, although the heat from the flame is so intense that long after the sheet has reached the lowering table, it is too hot for one's hand to rest upon with comfort. This intense heat dries, or more properly speaking, crystalizes the ink, and at the same time eliminates static which heretofore has been a troublesome factor. Owing to the drying action, the printer is enabled to adjust the ink fountain to supply a full body of ink without serious danger of smutching, commonly called offsetting.

To resume the operation, the sheet is next taken by the grippers of the transfer cylinder, and is immediately transferred to the grippers of the second impression cylinder, by which it is brought into contact with the second set of plates carried by the bed, after which the sheet is stripped from the cylinder, and passes first between the tapes 18 and 19, and then between the tapes 20 and guides 27. The carriage 21 being in its rearward position, the tapes 20 propel the sheet into engagement with the front stops 29, and the carriage then starts forward. At this instant, the automatic valves open fully, and air and gas are supplied to the second set of burners to cause a flame of maximum intensity to be directed onto the sheet just at the point where it leaves the tapes 20.

While these burners might remain stationary, yet in a press having a surface speed of, say, one hundred seventy feet per minute, it is desirable to move the burners forward at a lower speed than that of the sheet, so that the actual relative surface speed of the sheet is the difference between that of the sheet and that of the burners. An actual surface speed, possibly as low as fifty feet per minute, can be maintained with safety and without danger of burning, or even scorching, the sheet. Of course, the lower the surface speed the greater will be the heating of the sheet, and the consequent drying effect. In the present example, the carriage 60 for the second set of burners is connected by links 97 to the levers 25 about midway between the fulcrums of the levers and the pivoted connections of the links 24 which reciprocate the carriage 21. It follows that the actual relative surface speed of the burners and sheets is about half that of the sheet.

In the present example, the sheet carriage 21 travels forward only far enough to deposit the sheet on the lowering table 22,—hence it follows that the burner carriage 60 must not go forward a distance equal to the travel of the sheet carriage 21,—otherwise, they would collide. In this embodiment, therefore, the burner carriage is caused to reverse its movement after the burners have traversed a part only of the sheet (see Fig. 1). However, the remaining surface of the sheet is thus traversed by the burners during their rearward movement, and of course, inasmuch as the sheet is now stationary, the relative surface speed of the burners to the sheet is the same as before. When a crank is used to supply the necesary motion of the burner carriage, the latter is moving

very slowly for a short time, as its direction is reversed. In case this slowing down should tend to scorch the sheet, the form of the cam 74 may be such as to reduce the flame for an instant, as by providing the cam path with a drop or indentation 98, which allows the spring 81 to assert itself to operate the valves as before described.

As sheets of various dimensions are printed in the same press, provision is made to vary the duration of the maximum flame, so that it shall be maximum only during the traversing of the burners by the sheet. This is conveniently accomplished in the present example by making the depression in the cam adjustable, as by making the cam in two relatively adjustable parts 99, one of which is slotted to receive clamping screws 100 threaded into the other part, so that by simply lowering these screws, turning one part relatively to the other, and then tightening the screws, the cam may be caused to furnish the desired duration of maximum flame. It will be remembered that in the present example, the cam is carried by a vertically movable impression cylinder. This being so, it is evident that provision should be made to compensate for this movement,—otherwise, it would affect the operation of the burners. This compensation is conveniently accomplished, herein, by mounting the cam eccentrically with relation to the cylinder (see Fig. 2) by an amount equal to the vertical travel of the cylinder, the effect being to keep the cam path in the same position which it would occupy if the cam were concentric with a vertically stationary cylinder.

When the press, for any reason, slows down or stops, the blower, being driven by the press, correspondingly slows down or stops, and correspondingly reduces or stops the forced air supply to the burners. When this happens, in the case of the burners on the carriage 60, the flames simply flicker in an upward direction, owing to the absence of the air blast, and do no harm, but in the case of the burners adjacent the first impression cylinder, reduction or stoppage of the air blast is insufficient to keep the flames from burning the sheet. To take care of this condition, I have provided a gas valve 101 (see Fig. 3), which is responsive to the speed of the press as by the use of a speed-responsive device such as a centrifugal governor 102, of common form, suitably driven by the press, as by pulleys 103 and 104, and a belt 105. This valve, like the valve 66, is provided with means for preventing it from closing entirely, it being provided, for this purpose, with a stop collar 106 secured to a spindle 107, which constitutes the stem of the valve, as well as the shaft of the governor.

The general operation should be evident from the foregoing without further description, except to emphasize the fact that the controls of the air blast and gas are such as to furnish maximum and minimum heat at the proper times, thus not only avoiding any possibility of setting fire to the printed sheet or to the tympan sheet, but also effecting a marked economy in the use of gas.

Having thus described one embodiment of the invention, and one means for carrying out the method, but without limiting myself thereto, what I claim and desire by Letters Patent to secure is:

1. The method of treating a freshly printed sheet, characterized by directing flame at the moist ink while imparting a relative movement to the sheet and flame to cause the printed surface to be traversed by the flame.

2. In a printing press, the combination of means for printing the sheet, means for producing a flame and directing the same onto the printed surface of the sheet, and means for causing a relative movement of the sheet and the flame to prevent ignition of the sheet.

3. The combination with a printing press, of a burner for producing a flame to which the printed face of the sheet is exposed during its travel, means operated by the press for causing a periodic reduction of the flame while the press is running, and means operated by said press for reducing said flame when said press stops.

4. The combination with a printing press, comprising reciprocating sheet-feeding means having a sheet-feeding movement and a non-feeding movement, of a burner for producing a flame to which the printed face of the sheet is exposed during its travel, and means for causing reduction of said flame during the non-feeding movement of said sheet-feeding means.

5. The combination with a printing press comprising reciprocating sheet-feeding means having a sheet-feeding movement and a non-feeding movement, of a burner, means for supplying said burner with air and fuel, and means for causing a cessation of the supply of air and a reduction of the supply of fuel during the non-feeding movement of said sheet-feeding means.

6. The combination with a printing press comprising reciprocating sheet feeding means having a sheet-feeding movement and a non-feeding movement, of a burner, means for supplying said burner with air and fuel, an air-controlling valve, a fuel-controlling valve, and means operated by said press, for causing said valves to open for the sheet-feeding movement and to move toward their closed positions for the non-feeding movement of said sheet-feeding means.

7. In a printing press, the combination of sheet-feeding means, means for subject-

ing the printed sheet to the action of flame while the sheet is being moved, means responsive to the speed of the press for controlling the flame, and means for causing reduction of the flame during idle movement of said sheet-feeding means.

8. In a printing press, the combination of sheet-feeding means, means for subjecting the printed sheet to the action of flame while the sheet is being moved, means for causing reduction of the flame during idle movement of said sheet-feeding means, and means for causing reduction of the flame when the press stops.

9. In a printing press, the combination of sheet feeding means, means for subjecting the printed sheet to the action of flame while the sheet is being moved, means for causing the flame to burn with maximum intensity during feeding movement of said sheet feeding means and to burn with less intensity during non-feeding movement of said feeding means, and means for causing the flame to diminish as the speed of the press diminishes and to burn at minimum intensity when the press stops.

10. In a printing press, the combination of sheet-feeding means, a heater for subjecting the sheet to the action of heat, and means for causing said heater to travel along the sheet in the same direction but at a speed lower than that of the sheet.

11. In a printing press, the combination of sheet-feeding means, a heater for subjecting the sheet to the action of heat, and means to cause said heater to travel along the moving sheet in the same direction at a lower speed than that of the sheet and to travel along the sheet in the opposite direction during inaction of the sheet.

12. In a printing press, the combination of reciprocating sheet-feeding means which feeds the sheet in one direction and has an idle movement in the opposite direction, a heater for subjecting the sheet to the action of heat, and reciprocating heater moving means to cause said heater to travel along the travelling sheet in the same direction at a lower speed than that of the sheet, and to travel along the sheet in the opposite direction during the idle movement of said sheet-feeding means.

13. In a printing press, the combination of a heater for subjecting the sheet to the action of heat, means for producing relative movement of said heater and the sheet to cause said heater to traverse the sheet part way across the latter and for producing movement of said heater in the opposite direction to cause said heater to traverse the remainder of the sheet, and means for causing temporary reduction of the heat produced by said heater during reversal of movement of said heater.

14. In a printing press, the combination of a heater for subjecting the sheet to the action of heat, means for producing relative movement of said heater and the sheet to cause one to traverse the other, and heater controlling instrumentalities including means of adjustment to sheets of different widths to cause a certain heating effect of said heater during different predetermined portions of said movement corresponding to the widths of sheets and to cause a lesser heating effect of said heater during other predetermined portions of said movement.

15. In a printing press, the combination of a heater for subjecting the sheet to the action of heat, means for producing relative movement of said heater and the sheet to cause one to traverse the other, and heater controlling instrumentalities including a cam having means of adjustment to sheets of different widths to cause a certain heating effect of said heater during different predetermined portions of said movement corresponding to the widths of sheets and to cause a lesser heating effect of said heater during other predetermined portions of said movement.

In testimony whereof, I have signed my name to this specification.

LEO W. BRUNELL.

April 3, 1928. 1,665,185

L. W. BRUNELL

MEANS FOR TREATING SHEET MATERIAL WITH HEAT

Filed March 19, 1927 4 Sheets-Sheet 1

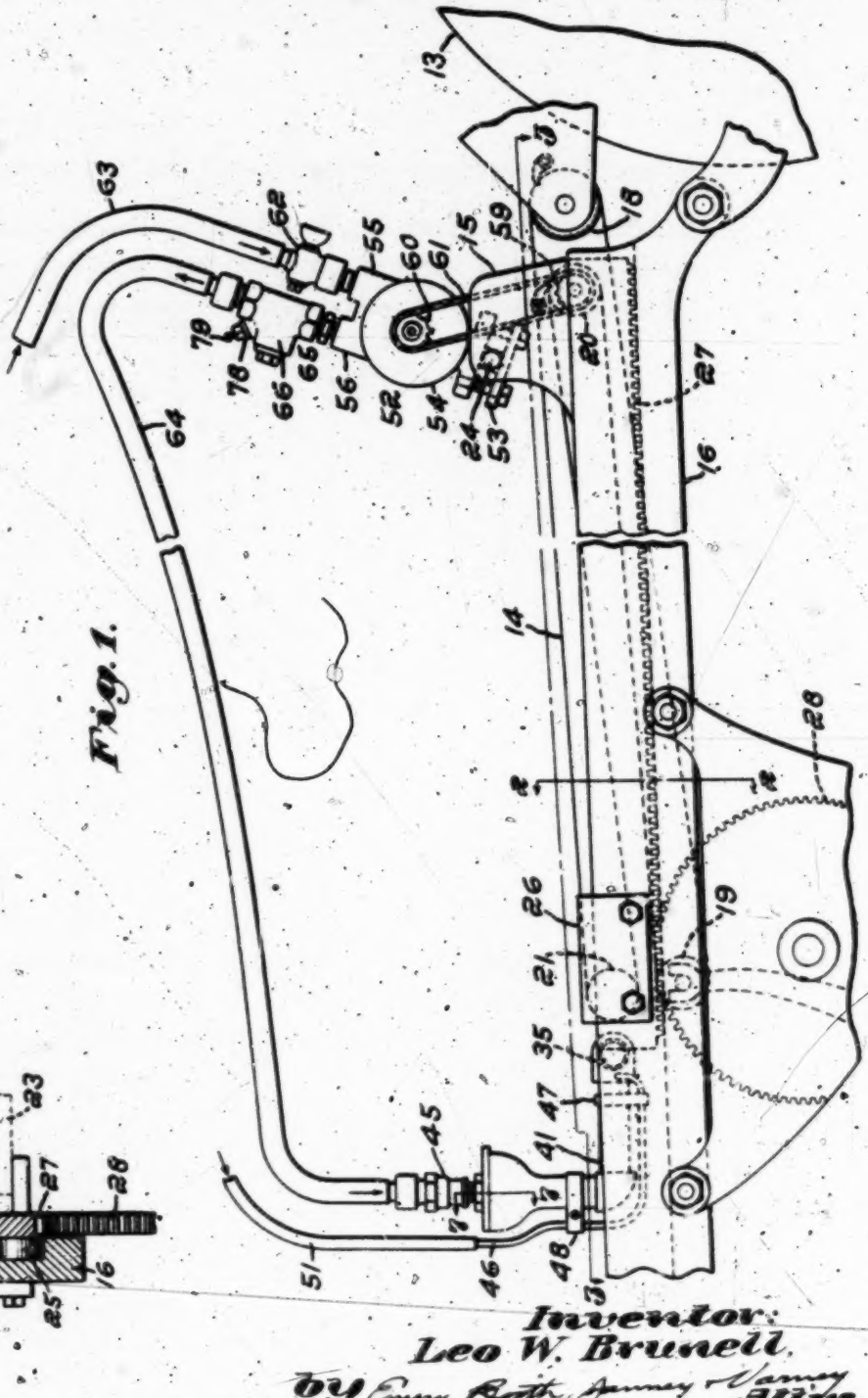


Fig. 1.

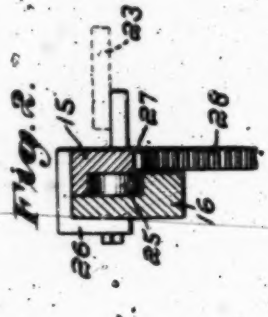


Fig. 2.

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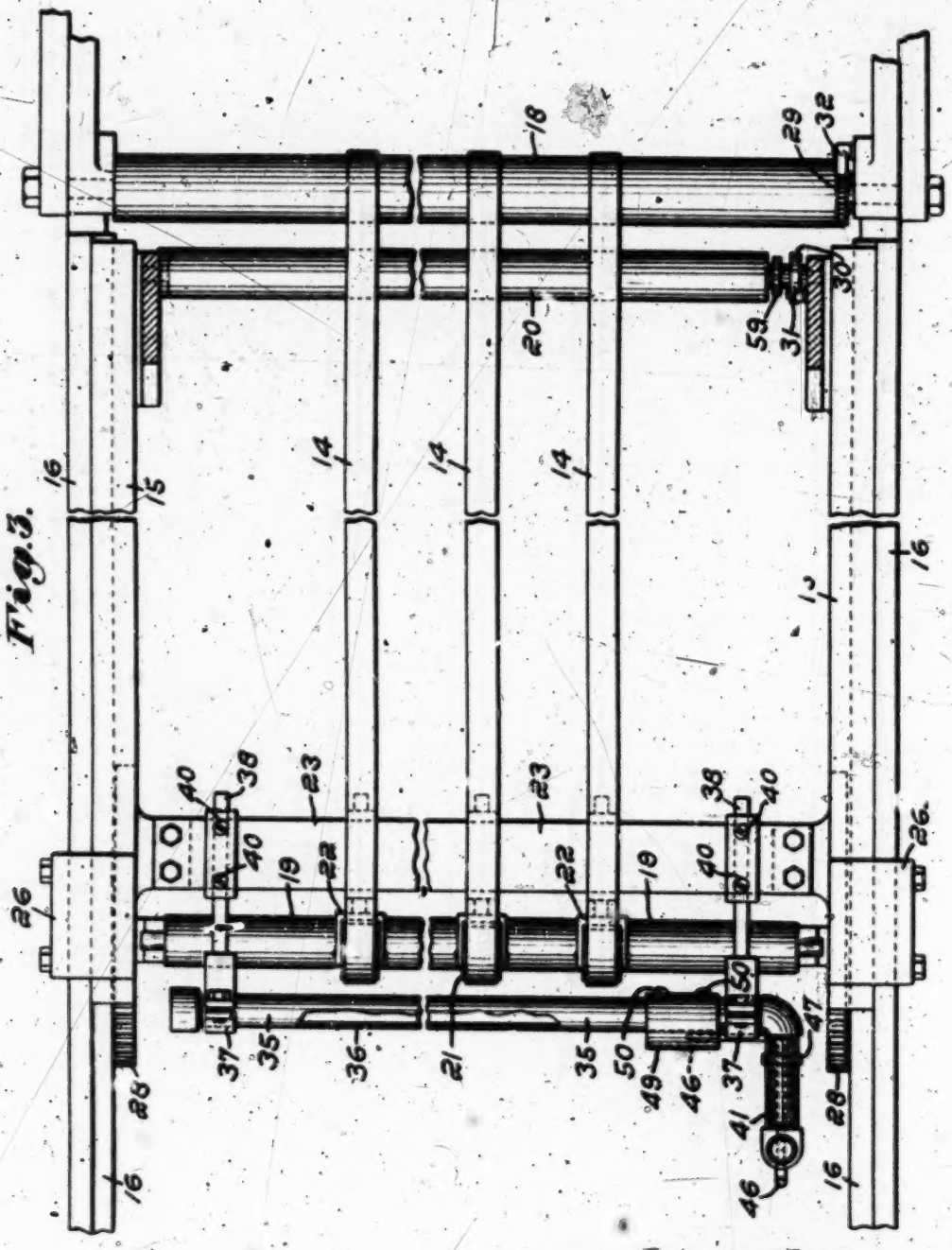
April 3, 1928. 1,665,185

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MEANS FOR TREATING SHEET MATERIAL WITH HEAT

Filed March 19, 1927 4 Sheets-Sheet 2

Fig. 3.



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MEANS FOR TREATING SHEET MATERIAL WITH HEAT

Filed March 19, 1927 4 Sheets-Sheet 3

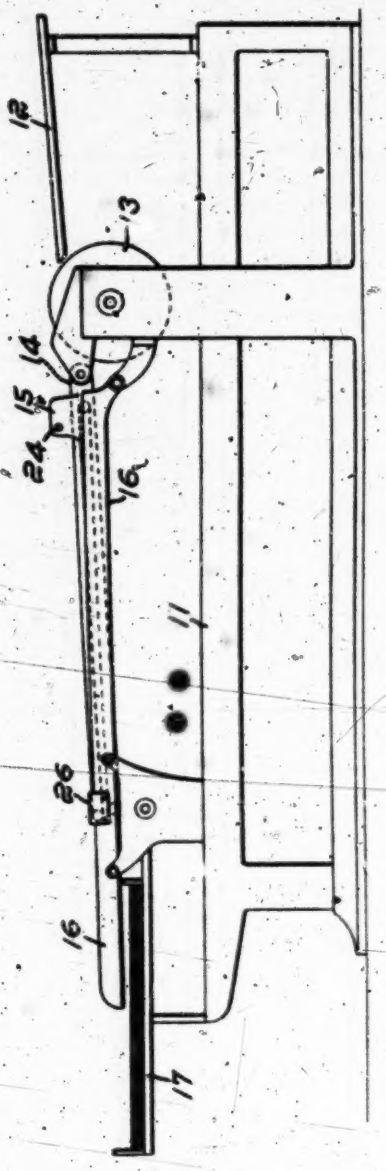


Fig. 4.

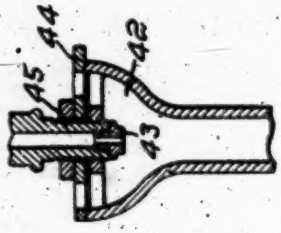


Fig. 2.



Fig. 6.

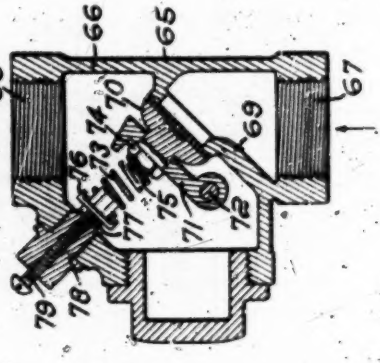


Fig. 5.

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MEANS FOR TREATING SHEET MATERIAL WITH HEAT

Filed March 19, 1927 4 Sheets-Sheet 4

Fig. 8.

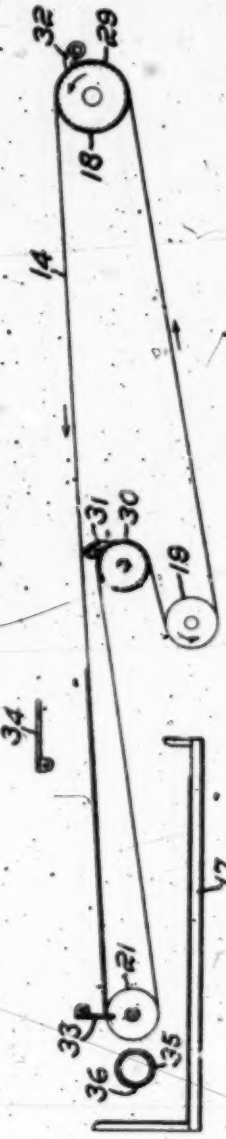


Fig. 9.

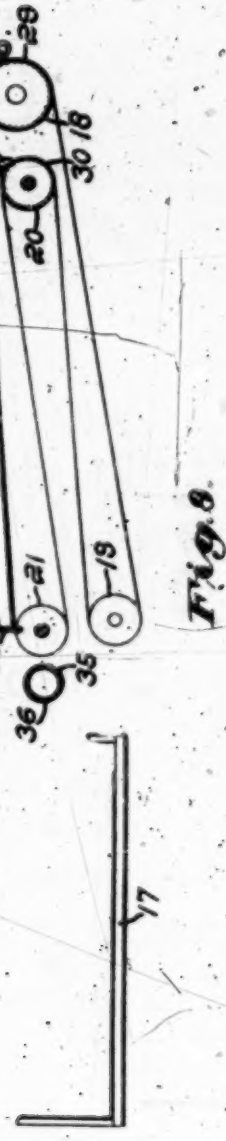
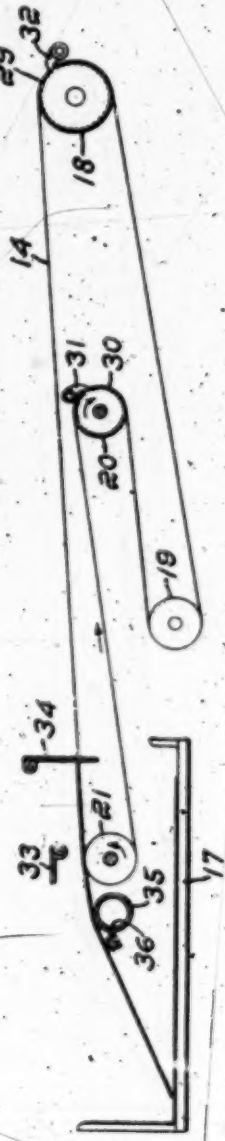


Fig. 10.



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Patented Apr. 3, 1928. 1,665,185

UNITED STATES PATENT OFFICE.

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MEANS FOR TREATING SHEET MATERIAL WITH HEAT.

Application filed March 19, 1927. Serial No. 176,633.

This invention relates to novel means for treating sheet material, such as paper, with heat furnished by a gas burner, between which and the paper there is a relative movement. The invention is particularly useful in connection with the drying of ink and the neutralizing of static charges on paper passing through or from a printing press.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation of a portion of a printing press equipped with heat treating means exemplifying the invention;

Fig. 2 is a sectional view, on line 2—2 of Fig. 1;

Fig. 3 is a horizontal, sectional view, on line 3—3 of Fig. 1;

Fig. 4 is a somewhat conventional illustration of the entire press in side elevation, simply to show the general arrangement of the press, but omitting the novel features of the invention;

Fig. 5 is a vertical, sectional view of the valve, which, in conjunction with a pump, controls the flow of gas to the burner;

Fig. 6 is a vertical, sectional view of the pump;

Fig. 7 is a sectional view, on an enlarged scale, on line 7—7 of Fig. 1, illustrating the means for mixing gas and air to be supplied to the burner; and

Figs. 8, 9 and 10, are diagrammatic views illustrating the operation of the sheet-feeding means, in connection with the burner.

Referring to the drawings, and to the embodiment of the invention which is selected for exemplification, there is shown in Fig. 4 one type of press, in connection with which the invention may be used. The press includes the main frame 11, a feed table 12, a cylinder 13, a set of feed tapes 14, which receive the sheets one by one from the cylinder, and a reciprocating carriage 15, which travels on rails 16 and causes the tapes to deposit the sheets one by one on a jogger 17.

The mechanism for controlling the operation of the tapes will now be described, reference being had at first to Fig. 8. Each tape is an endless band, which extends part way around each of a set of rollers 18, 19, 20 and 21. The rollers 18 and 19 are mounted on the press frame (see Fig. 3), while the rollers 20 and 21 are mounted on the carriage. There are individual rollers 21, one for each tape, and each of these rollers is carried by a bracket 22 secured to a transverse tie-piece 23, which is a part of the carriage 15. At the other end of the carriage, there is another tie-rod 24 (see Fig. 1) connecting the two sides of the carriage. The carriage is equipped with rollers 25 (see Fig. 2), which run on the rails 16, respectively. Brackets 26, secured to the rails, and overlying the sides of the carriage (see Fig. 2), prevent the carriage from being lifted. The carriage is reciprocated by mechanism including racks 27 on the under side of the carriage, and meshing with gears 28.

As herein shown, the reciprocating movement of the carriage is utilized to impart an intermittent movement to the tapes, the arrangement being such that that portion of the tapes on which the sheet rests (see Figs. 8, 9 and 10) moves forward with the carriage, and at the same speed, whereas during the backward movement of the carriage, the tapes remain stationary. This is conveniently accomplished by providing two ratchets 29 and 30 (see Fig. 8), one secured to the roller 18 and the other to the roller 20, and cooperating with these ratchets are pawls 31 and 32, respectively. As clearly shown in Fig. 8, one ratchet and its associated pawl is so arranged that it is active, while the other is inactive. Furthermore, the pawls and ratchets are so arranged that, during the forward movement of the carriage from the position shown in Fig. 8, to and beyond the position shown in Fig. 9, the pawl 31 does not permit the ratchet 30 and roller 20 to rotate, whereas the pawl 32 permits the ratchet 29 and roller 18 to rotate contra-clockwise, as shown in Fig. 9. Accordingly, during the forward movement of the carriage, the upper part of the tape which sustains the sheet travels forward with the carriage, and at the same speed. On the other hand, during the backward travel of the carriage, as illustrated in Fig. 10, the pawl 32 now holds the ratchet 29 and roller 18 against rotation, and the pawl 31 permits rotation of the ratchet 30 and

Defendant's Exhibit P-2.

INTERCHEMICAL CORPORATION
75 Varick Street, New York City

July 22, 1941.

Messrs. Nims & Verdi,
60 East 42nd Street,
New York, N. Y.

Dear Sirs:

This will acknowledge receipt of your letter of July 18, 1941, with reference to our letter of July 9, 1941, to your client, Sinclair Carroll Co., Inc.

While our letter to your client relates to any inks which your client is manufacturing or selling which infringe our U. S. Letters Patent No. 2,087,190, we refer more particularly to inks which are designed to be set by the application of heat and which are sold to publication printers for use on rotary presses equipped with heating units.

Very truly yours,

INTERCHEMICAL CORPORATION,

By H. B. WOODMAN,
Vice-President.

HBW:F

Defendant's Exhibit Q-2.

Doughty U. S. Patent No. 1,439,695.

(Opposite ☞)

Patented Dec. 26, 1922. 1,439,695

UNITED STATES PATENT OFFICE.

HOWARD WATERS DOUGHTY, OF AMHERST, MASSACHUSETTS, ASSIGNOR TO ALCHEMIC GOLD COMPANY, INC., A CORPORATION OF NEW YORK.

INK.

No Drawing. Application filed May 8, 1922. Serial No. 559,419.

To all whom it may concern:

Be it known that I, HOWARD WATERS DOUGHTY, a citizen of the United States, residing at Amherst, in the county of Hampshire, State of Massachusetts, have invented certain new and useful Improvements in Inks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to inks and vehicles therefor, and particularly to metallic pigment inks suitable for use in stamping titles and decorative designs on book bindings and for other purposes to which the ink may be adapted.

In stamping titles in gold, for example, on books, labels and like materials, it has been the practice heretofore to employ gold or imitation gold leaf. The leaf is applied manually after the surface of the material has been treated with size, and the surplus leaf must be removed after stamping. Several operations are thus involved and the application of leaf in the manner described is consequently expensive. The use of artificial leaf effects a saving only in the cost of the leaf. Artificial leaf is, moreover, unsatisfactory because of the inferior quality of the work which quickly tarnishes when exposed to the effect of the atmosphere.

The use of metallic pigment inks has been suggested heretofore as a substitute for metallic leaf in stamping operations. No suitable inks have been available, however, and it has been impossible to produce satisfactory work therewith. A difficulty which has prevented the use of metallic pigment inks is due to vehicles which dry too rapidly on the inking rolls, covering them generally with a gummy coating which prevents transfer of the ink to the type or die. In avoiding this extreme it is necessary to provide an ink which when once applied will dry rapidly.

It is the object of the invention, therefore, to provide an ink and an ink vehicle having the necessary properties, among others comparative slowness in drying without a tendency to become gummy, a consistency permitting transference of the ink through inking rolls to the type or die, rapid drying when applied to the work, and ability to protect the pigment from oxidation and consequent discoloration.

I have discovered that these desirable properties may be imparted to the ink by the use of a suitable medium in the vehicle for the pigment and that such a medium will, moreover, permit rapid drying of the ink by the application of heat to the type or die. The medium should be volatile, i. e., capable of being vaporized without carbonization, but its boiling point should be relatively high to reduce vaporization at atmospheric temperatures, and consequently to prevent rapid drying on the inking rolls. The medium must, moreover, be a solvent for the body of the vehicle. Preferably the boiling point of the selected medium should be between 200° and 300° C., a boiling point lower than 250° C. being desirable. Solvents boiling materially below 200° C. are unsuitable because the ink dries too rapidly on the rolls and becomes gummy. Solvents boiling materially above 300° C. are likewise unsuitable because the ink cannot be successfully dried except by the application of impracticably high temperatures. A suitable medium may be found in the derivaties of the terpene series of hydrocarbon compounds, the alcohols, of which terpineol is an example, being admirably adapted for the purpose. Terpineol is capable of imparting the desired properties to the vehicle in a marked degree, and is at the same time readily available in commerce and relatively inexpensive. Other suitable solvents are benzyl alcohol and certain esters of aromatic acids such as terpinyl acetate, benzyl acetate and ethyl benzoate. Oil of dammar resin is also a suitable solvent, this and the other solvents mentioned having the distinguishing characteristics above referred to.

In carrying out the invention the solvent is combined with a thickening agent forming the body of the vehicle. Preferably a resinous material such as colophony (ordinary rosin), dammar, copal, Burgundy pitch or Canada balsam, is dissolved in the solvent to produce a vehicle of the desired consistency. A proportion of benzoin may be added with advantage to the composition, replacing a

portion of the other resinous material, or benzoin may be substituted for either of the resins mentioned, which, of course, may be mixed or combined in any desired proportions, although for commercial reasons it is preferred to employ colophony alone as a resinous ingredient of the composition. The pigment, preferably a bronze or other metallic powder of the desired color, is thoroughly incorporated with the vehicle to complete the ink.

It is to be understood that equivalents of the terpineol, benzyl alcohol or other solvent may be substituted therefor and that materials naturally containing these solvents may be employed. Artificial mixtures containing the solvents mentioned may be used also. Natural or artificial mixtures of the solvent should have a minimum boiling point of substantially 200° C. to avoid too rapid drying of the ink upon the rolls.

The bronze or other metallic powder used may be the ordinary article of commerce and may consist, for example, of an alloy of copper with other metal or metals adapted to impart the desired color to the alloy. The alloy is reduced to a state of fine subdivision in the usual manner. Metallic powders containing metals other than copper can be used.

As an example of the application of the invention, the vehicle may comprise four parts of the solvent, benzyl alcohol for example, to one part of ordinary rosin. Preferably the benzyl alcohol is heated to a temperature ranging from 100° to 130° C. and is maintained at that temperature while the rosin is dissolved therein. The proportions of resin and solvent may be varied within the limits necessary to produce a vehicle of the proper viscosity. The vehicle and metallic powder are thoroughly mixed preferably in the proportions of two parts of the powder to one part of the vehicle.

The ink produced as described may be applied by means of the usual ink fountain or table to the inking rollers and thence transferred to the type or die. Drying of the ink on the rollers, a fault which has characterized inks heretofore suggested, is avoided. The ink dries very slowly at atmospheric temperature owing to the high boiling point of the volatile solvent. It dries rapidly, however, when applied with a heated die. The impression is highly glossed and the vehicle forms a lacquer which protects the pigment from tarnishing, thus providing a permanent and highly satisfactory title or decoration on book bindings and the like. The color will depend upon the particular pigment employed which may be other than metallic in character.

The ink described, though particularly suitable for book-binders' use, will serve other purposes of decorative printing. It is adapted to materially reduce the cost of such printing because of the low cost of the ink and the simplicity of its application.

Various changes may be made in the details of the invention without departing therefrom or sacrificing any of the advantages thereof.

I claim:

1. An ink having a metallic pigment and a vehicle comprising a resinous substance and a volatile solvent therefor, the boiling point of which is not materially lower than 200° C.

2. An ink having a metallic pigment and a vehicle comprising a resinous substance and a volatile solvent therefor with a boiling point between 200° and 300° C.

3. An ink having a metallic pigment and a vehicle comprising a resinous substance and a volatile solvent therefor with a boiling point between 200° and 250° C.

4. An ink having a metallic pigment and a vehicle comprising ordinary rosin and a volatile solvent therefor, the boiling point of which is not materially lower than 200° C.

5. An ink having a metallic pigment and a vehicle comprising ordinary rosin and a volatile solvent therefor with a boiling point between 200° and 300° C.

6. An ink having a metallic pigment and a vehicle comprising ordinary rosin and a volatile solvent therefor with a boiling point between 200° and 250° C.

7. An ink having a metallic pigment and a vehicle comprising a resinous substance and benzyl alcohol as a solvent therefor.

8. An ink having a metallic pigment and a vehicle comprising a resinous substance and a solvent therefor containing benzyl alcohol.

9. An ink having a metallic pigment and a vehicle comprising a solvent containing benzyl alcohol and a thickening agent dissolved therein.

10. An ink having a metallic pigment and a vehicle comprising a solvent, the boiling point of which is not materially lower than 200° C. and a thickening agent dissolved therein.

11. An ink having a metallic pigment and a vehicle comprising a solvent with a boiling point between 200° and 300° C. and a thickening agent dissolved therein.

12. An ink having a metallic pigment and a vehicle comprising a solvent with a boiling point between 200° and 250° C. and a thickening agent dissolved therein.

13. In an ink a vehicle comprising a resinous substance and a volatile solvent therefor, the boiling point of which is not materially lower than 200° C.

14. In an ink a vehicle comprising a

resinous substance and a volatile solvent therefor with a boiling point between 200° and 300° C.

15. In an ink a vehicle comprising a resinous substance and a volatile solvent therefor with a boiling point between 200° and 250° C.

16. In an ink a vehicle comprising ordinary rosin and a volatile solvent therefor, the boiling point of which is not materially lower than 200° C.

17. In an ink a vehicle comprising a resinous substance and benzyl alcohol as a solvent therefor.

18. In an ink a vehicle comprising a resinous substance and a solvent therefor containing benzyl alcohol.

19. In an ink a vehicle comprising a solvent containing benzyl alcohol and a thickening agent dissolved therein.

20. In an ink a vehicle comprising a solvent containing benzyl alcohol and ordinary rosin dissolved therein.

21. In an ink a vehicle comprising ordinary rosin and benzyl alcohol as a solvent therefor.

22. In an ink a vehicle comprising a solvent, the boiling point of which is not materially lower than 200° C. and a thickening agent dissolved therein.

23. In an ink a vehicle comprising a solvent with a boiling point between 200° and 300° C. and a thickening agent dissolved therein.

24. In an ink a vehicle comprising a solvent with a boiling point between 200° and 250° C. and a thickening agent dissolved therein.

In testimony whereof I affix my signature.

HOWARD WATERS DOUGHTY.

Defendant's Exhibit T-2.

COPY

Liber A158 Page 182

Assignment.

WHEREAS, ALCHEMIC GOLD COMPANY, INC., a New York corporation, is the owner of the entire right, title and interest in and to certain Letters Patent of the United States pertaining to inks and ink vehicles, to wit:

Howard Waters Doughty, No. 1,439,695, Dec. 26, 1922
" " " " 1,439,696, Dec. 26, 1922
" " " " 1,607,730, Nov. 23, 1926

and

WHEREAS FRED'K H. LEVEY CO., INC., a New York corporation, is desirous of securing the entire right, title and interest in and to said Letters Patent, subject to the conditions as hereinafter set forth:

NOW, THEREFORE, in consideration of Fifteen Dollars ($15.00) in hand paid and other valuable considerations, receipt whereof is hereby acknowledged, said ALCHEMIC GOLD COMPANY, INC., has sold and assigned, and by these presents does hereby sell and assign to said FRED'K H. LEVEY CO., INC., its successors and assigns, the entire right, title and interest in and to said Letters Patent No. 1,439,695, No. 1,439,696 and No. 1,607,730, including reissues and extensions thereof, reserving, however, to said ALCHEMIC GOLD COMPANY, INC., its successors, assigns and sub-licensees, the exclusive right and license to manufacture, sell and use inks and vehicles for inks which are employed in stamping as distinguished from letterpress, offset, lithographic and intaglio printing, said Letters Patent and all rights thereunder being otherwise to be enjoyed exclusively by

said FRED'K H. LEVEY CO., INC., its successors and assigns, to the full end of the terms of said Letters Patent.

AND, said ALCHEMIC GOLD COMPANY, INC., also grants to said FRED'K H. LEVEY CO., INC., its successors and assigns, the right to sue for and collect any and all claims, demands and choses in action of any nature whatsoever in law or in equity which said ALCHEMIC GOLD COMPANY, INC., has or may have arising from or growing out of the infringement at any time prior to the date hereof, upon any of said Letters Patent, except in so far as such infringement relates to the exclusive right and license to manufacture, sell and use inks and vehicles for inks as specifically reserved herein to ALCHEMIC GOLD COMPANY, INC., its successors, assigns, and sub-licensees.

IN WITNESS WHEREOF, said ALCHEMIC GOLD COMPANY, INC., has caused this assignment to be executed by its duly authorized officers for and on its behalf.

ALCHEMIC GOLD COMPANY, INC.

By SIDNEY SATENSTEIN /s/
President

Defendant's Exhibit T-2.

STATE OF NEW YORK }
COUNTY OF NEW YORK } ss:

(SEAL)

On this 10th day of November, 1933, before me personally appeared SIDNEY SATENSTEIN, to me known, who, being by me duly sworn, did depose and say that he resides in the State of New York and that he is the President of ALCHEMIC GOLD COMPANY, INC., the corporation described in and which executed the foregoing instrument; that he knows the seal of said corporation; that the seal affixed to said instrument is such corporate seal; that it was so affixed by the order of the Board of Directors of said corporation; and that he signed his name thereto by like order.

WITNESS my hand and Notarial seal this 10th day of November, 1933.

CAROLINE R. STIGLMAYER /s/
Notary Public

Notary Public, Westchester Co.
Cert. filed West. Co. Register
N. Y. Co. Clerk's No. 33, Reg. No.
Commission expires Mar. 30, 19

(SEAL)

RECORDED
TRANSFERS OF PATENTS
U. S. PATENT OFFICE
NOV. 11, 1933
LIBER A158 PAGE 182
CONWAY P. COE,
Commissioner of Patents

Memorandum.

This suit involves the validity of Letters Patent No. 2,087,190, granted July 13, 1937, to the International Printing Ink Corporation, New York—an Ohio corporation—the name of which has since been changed to the Interchemical Corporation, the plaintiff herein.

The original inventor and patentee is Albert E. Gessler. The patent was applied for July 14, 1932, renewed April 11, 1936, and finally issued July 13, 1937. According to the patent his invention relates to printing inks, and has for its object the preparation of a novel type of printing ink claimed to possess many advantages over the printing inks theretofore known, and overcoming many of the disadvantages associated with the procedure which it has been necessary to use in order that such inks may be properly applied to produce a satisfactory print.

It is claimed the ink described in the patent has introduced a rather revolutionary change in the very old art of printing. Before this patent it seems printing inks have often been made by grinding pigments in oil or oil varnishes, or both, and had been characterized by their relatively slow rate of drying, depending upon polymerization, oxidation and/or absorption, and as a result have experienced great difficulty in the printing process by greatly delaying the speed of operation. This necessitated the maintenance of large and cumbersome auxiliary equipment and extra labor at great expense, and also a dependence of the printing process upon the time required to obtain a complete drying.

Ordinarily printing has been done by spreading a thin ink film on a series of rollers and then taking the ink from the rollers onto raised type, or cuts, and pressing those against the paper. To do this successfully it was necessary the ink be rather thick, of the consistency of molasses. These inks have been made out of drying oils, principally linseed oil, with which the pigment was mixed. Linseed oil is what is known as a drying oil, in that it

gradually hardens when exposed to the air, due to its absorption of oxygen from the air and changing its state. This drying ordinarily takes a day—and even by the use of so-called dryers; that is chemicals to hasten its absorption of oxygen, it formerly took at the best two or three hours to dry. This meant that ordinarily the printed impression did not become hard and dry until two or three hours after it was made. This caused delay and expense, particularly where it was sought to print on both sides of the paper, because having printed one side it was necessary to wait until that side dried before the other side of the paper could be printed. This because the ink, not being dried, would smudge or offset.

Newspapers are printed very fast, because they use paper resembling blotting paper, which consists of a long web of paper run over a cylinder with type on it, printing one side of the paper, which then goes over another cylinder which prints on the other side. It is then cut up and folded right on the press. This is possible, because the paper being like a blotter, absorbs the ink and enables the other side to be printed at once.

When it comes to finer quality of printing—say on good paper with a smooth finish, which it is necessary to use if printing of pictures and half tones is to be done—a quality of paper very different from that used for newspapers is necessary. Formerly, for instance, when it came to printing magazines with large circulations, such as the Saturday Evening Post, Colliers, etc., it was necessary to use a flat bed press, printing on one side of the sheet, and then pile up between the sheets with something to keep them from sticking, and wait three or four hours before printing the other side.

As the circulation became larger the web press was used. Trouble was encountered with the ordinary standard linseed oil, because ink on the first side of the web would not dry. Many experiments were tried to make it possible

to immediately print the second side. A traveling blotter was used which traveled along behind the paper, and then was rolled up on a different roll. This not only did not prevent smudge entirely, but took a good deal of the wet ink off the paper, so the final copy was light; that is, did not have ink enough on it.

Therefore the art attempted to make the ink dry faster by causing the drying oil to absorb oxygen faster. This by heating and blowing ozone on it. That is, after the sheet came out from the type, and before the second side was printed, it was passed over a steam roller or device which warmed the paper. At the same time ozone was blown on it—ozone being a very active form of oxygen—which was absorbed by the oil faster than it would be if it was just quietly exposed to the air.

This method did not prove commercially successful. Shooting ozone on the paper was a difficult and dangerous thing to do in a printing plant, although it did make the drying oils oxidize more rapidly than they had before. That seems to have been the status of the art when the invention in question appeared

The next step was an attempt to speed up printing by using volatile solvents that would evaporate very quickly. But this presented a new difficulty, in that the ink would dry on the rollers before printing, would not print properly as the ink must be wet when printed. It proved more successful, perhaps, in what is known as rotogravure printing, but did not help in the ordinary printing from raised type, with which the thin, watery ink cannot be used. The patentee, Gessler, a chemist employed by a chemical company making pigments and chemicals, was asked by an ink manufacturer to make an odorless ink, and while engaged in that research he claims to have developed the ink in question, which was not only odorless, but could be dried very rapidly on a press. He states in his patent (p. 1, column 1, line 41), after stating the problem, that

it had been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers, because it was well-known that such lacquers are characterized by a high degree of volatility.

Such rapid drying, however, would render an ink made therewith unsuitable for printing from plates or rollers, because they will quickly dry and harden thereon, and will have only the effect of yielding dry or half dry material to the printing form or type, and no satisfactory impression can be made on the material to be printed.

He states (p. 1, column 2, line 3):

> "I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided".

Further he states that if the solvents used are too slow in evaporating, the same difficulties which occur in the case of ordinary oil varnish inks, are encountered. He then states he has found (p. 1, column 2, line 10):

> "* * * that certain such high boiling solvents, very well adapted to dissolve cellulose compounds, have at room temperature such slow drying properties that, while they may be employed as solvents in this ink, and while an excellent impression may be transferred to the surface to be printed upon, the impression will nevertheless be so moist that it is likely to become blurred or smudged by rubbing after many hours or even days."

Then, line 19:

> "This defect, however, may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit, at temperatures elevated above room tem-

peratures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile".

By room temperature is meant 20 to 25 degrees centigrade.

This ink of Gessler's is different from the ordinary linseed oil ink, being made of a thickener dissolved in a solvent. The thickener may be a resin or nitrocellulose, or some material of that sort dissolved in the solvent, making a thick solution like linseed oil. However, it does not dry by oxidation like linseed oil, but does dry because the solvent evaporates leaving the thickener which acts as a binding substance that anchors the pigment to the paper. A successful ink for the purposes of the art in question has to be like linseed oil, capable of being spread out in a think [*sic*] film that can be put on the type without it drying.

He claims to have studied the problem and experimented with a number of different solvents, all of which were rejected by printers because they became hard or gummy on the rollers, and would not print. A few printed all right, but took longer than a linseed oil ink to dry, so were not an improvement.

It finally came to Gessler's attention, he testified, that some printing presses were provided with steam-heated rollers. He claims he solved the problem by producing his ink which dried almost instantly when run on an ordinary press provided with a heating drum, or some means of heating the paper immediately after it had gone through the rollers of the press. That is, he claims to have produced an ink that could be printed from raised type and dried instantly. This, it is claimed, was a great boon to the printing industry, because it meant much more rapid, as well as high-grade printing. His ink differed from linseed oil ink in the use of a solvent that dried rapidly.

Memorandum.

The disclosure of the patent he claims; is the discovery for the first time that this problem could be solved; that a printing ink could be made wet enough to spread on the rollers, and do the printing without drying thereon, and that could be dried immediately thereafter. He then goes on telling the art how to make it, saying:

> "You have got to use a binder dissolved in a solvent, and you have got to use a solvent of particular vapor pressure".

Vapor pressure is the quality of a substance, such as a liquid, which causes it to evaporate. This pressure develops inside a liquid and tries to force the particles out of the liquid. It is common knowledge, of course, that a great many liquids; in fact most liquids if left alone, will eventually evaporate. That's because this so-called vapor pressure developed by the molecules inside the liquid tends to push them through the surface and out. This pressure, according to experts, is a perfectly definite, measurable characteristic; that is, the amount of vapor pressure a liquid has at any given temperature can be measured. Vapor pressure determines the rate of evaporation, is a physical property of the liquid itself, depending upon temperature to a certain extent. For instance, when a liquid is boiling actively, its vapor pressure is equal to the pressure of the atmosphere pushing down on it. The main statement of the claim of the patent is:

> "A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, * * * the liquid component having a vapor pressure at 20° C., as low as that of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with a solid component".

Memorandum.

Translating this into language that may be comprehended by the man in the street, it means the printing ink in question is substantially non-drying at ordinary temperatures, and dries instantly on heating of the printed matter. The claim is there had been no such thing as an ink that dried instantly by heating; that Gessler's would dry instantly by heating and was therefore imitated, adopted and used.

By using this ink the printer is enabled to run a web of paper through the press at a high speed. The web is then run through the heating device, which evaporates the solvent, thus drying the ink, and permitting the web to be immediately run through the press again and printed on the back side. Concededly the heating device, old in the art and not patentable, is an important part of the patent, which would not have taught anything if it had simply suggested the putting of butyl carbitol in the ink to see what happened.

The patent states you must have a solvent of certain definite vapor pressure characteristics. It names butyl carbitol as possessing the particular vapor pressure characteristics necessary to make the ink, and brings about the essential disclosure claimed for the patent, which is, in short, a printing ink that will stay soft on the rollers, yet dry instantly on application of heat—something that had never been done before, according to the claim.

The defendant in 1938 began to make one of these so-called heat-set inks, adopting as its solvent a petroleum fraction taken off the top of ordinary kerosene, with a vapor pressure it claimed to be about a third of the vapor pressure of butyl carbitol. The record establishes that Gessler was trying to make an odorless ink, and when he was told by Cray that heating means were used on the presses, he immediately picked out—according to his counsel—one of the inks which he had previously made for an odorless ink and pointed out that that ink would work as a quick-drying ink

on a press with a heater. He had never been in the printing business. He says he studied the question of making the ink out of something other than linseed oil, and also the question of getting a solvent and binder in an ink which would be odorless, and not evaporate, dry or harden on the usual long series of printing rollers.

He claims to have done this in 1930, furnishing the ink to one printing concern, which did not use it because it would not dry fast enough on the paper. According to his counsel Gessler brought out, and disclosed in his patent, two entirely new ideas. First: That to stay soft on the long series of printing rollers, it was necessary to have a solvent with a vapor pressure as low as that of butyl carbitol; that is .02 of a millimeter—an extremely low pressure. That is: It was necessary to have a solvent with a vapor pressure as low as that of butyl-carbitol in order for the ink to remain stable on the rollers. And, secondly, something he claims he did not previously know until told by Cray, that all presses had heaters; that one could get instant drying of a thick film of ink on the paper if one picked a solvent like butyl-carbitol, the vapor pressure of which rises rapidly when you heat it up to between 100° and 150°; the temperature to which the paper can be heated without burning or scorching.

It is claimed the prior art was interested because those who had studied the problem were under the impression the solvent had to be actually boiled off in order to get instant drying. There is testimony that Gessler furnished his butyl carbitol ink to the Cray-Finne Company in 1932. The latter added pigment and it was tested out at the Patterson Parchment Paper Company and demonstrated for the first time as a typographic ink which would set moist on the press and dry instantly by heat.

The Curtis Publishing Company, publishers of the Saturday Evening Post, heard of it, became interested and gave it a trial. The only complaint made by the Curtis

Company was that after a long run the printing rollers would develop very fine cracks. Dr. Gessler then adopted a new solvent, to wit, butyl carbitol acetate, which had a vapor pressure similar to that of butyl carbitol. This had very little effect on the rollers. This new solvent was tried out on the Curtis Company presses, when Gessler saw for the first time an imitation of his ink made by the Levey Company—the regular ink supplier of the Curtis Company—running on the same press. It is therefore charged their ink maker had produced a heat setting ink that acted similar to Gessler's. The Curtis Company thereupon threw out the Gessler ink in favor of a less expensive ink made by Levey.

Thereafter attempts were made to imitate the Gessler ink with a cheaper solvent. Mr. Cray tried various petroleum products that were on the market, such as kerosene and fuel oil solvents. The Continental Oil Company, after experimenting and testing different petroleum cuts, produced a petroleum cut which was a satisfactory substitute for butyl carbitol. It was a simple matter to substitute a petroleum cut with the same vapor pressure as butyl carbitol, the only requirement being it must have a low vapor pressure at room pressure, and the right pressure at high temperatures.

Butyl carbitol was not entirely successful as a solvent. Although it did not dry on the presses and dried out in the heaters, it caused the surfaces of the printing glue rollers to crack after a long-continued run. So Gessler says he looked around for a new solvent that would overcome this, and after research work in the Mellon Institute in Pittsburgh, found a solvent called butyl carbitol acetate, which he adopted as a substitute for butyl carbitol where the ink was used on glue rollers. However, he made no change for the ink used on rubber rollers. The substitution of the acetate for butyl carbitol prevented the glue rollers from absorbing moisture or water.

Memorandum.

To sum up: Gessler claims he invented a printing ink which, distinguishable from the prior art, not only as to oil varnish inks of the linseed type, but (p. 1, column 1, line 41):

> "It has also been proposed to use various types of lacquers in printing processes, particularly cellulose lacquers. As is well known, the cellulose solvents used in these lacquers are characterized by a high degree of volatility. Indeed, this characteristic is considered an advantage in lacquers, for in the ordinary use to which lacquers are put, a rapid drying or hardening is highly desirable".

The patent then continues (line 49):

> "However, it is obvious that such rapid drying renders inks made on this principle unsuitable for printing from plates or rollers; for, while they may be applied to printing plates or rollers, they will quickly dry and harden thereon and they will have only the effect of yielding dry or half dry material to the printing form from which, therefore, no satisfactory impression can be made on the material to be printed".

He then states the principal improvement he has discovered is that:

> "I have discovered, however, that if in contrast to the above, cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided".

What Gessler really did, therefore, was to discard the rapidly volatilizing solvent of the prior art lacquered inks,

and use in its place a solvent which did not evaporate quite so fast. In line 20, column 2, p. 1 he states:

> "This defect", [that is the smudging] "may be remedied by the present invention, which involves a recognition of the principle that some of these high boiling solvents exhibit, at temperatures elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while at the same temperatures others show little change in their vapor pressures and therefore are practically non-volatile".

In short, his idea embodies the use of a solvent of a type that will keep the ink soft and liquid while it is being spread on the rollers and making the impression on the paper, but which having a high degree of volatility is easily dried by heat applied to the web immediately upon completion of the printing operation.

He then says he found butyl carbitol to be a solvent meeting these requirements, because it had a quick increase in vapor pressure at temperatures above room temperature, so would volatilize rapidly, and any rapid evaporation at room temperature is prevented by the use of a solvent with a high boiling point.

Turning to the defendant's case we find it pleads, in addition to lack of a patentable invention, that the claims of the plaintiff's invention are anticipated by the prior art, citing a long list of patents, only a few of which it is necessary to notice.

The first patent cited in defense is that of Lefferts and Stevens, No. 380,654, issued April 3, 1888. This invention relates to an improved ink for printing on celluloid and other pyroxyline compounds, the ingredients being first (p. 1, col. 2, line 51), a solvent or mixture which is a solvent of pyroxyline; second, a pigment or coloring material in powdered form; third a gum, or gums, or binding agent for holding the particles of pigment together.

Memorandum.

In describing the function of the solvents, which is to penetrate the material and serve as a vehicle for carrying the color and fastening it onto the surface, the patentee says it is desirable that they be of low volatility. And (p. 2, col. 1, line 63):

> "As above stated, it is desirable that the substances used for this office be of a slow-drying nature by virtue of which property they will keep the ink in a moist condition for a long time, producing an action somewhat similar to that of linseed-oil used in the preparation of common engraving or printing ink".

It is then pointed out that this improved ink, when used in connection with heat and pressure, as above stated, produces a hard impression, and the printed sheets or articles may be piled together after they are taken from the press. The inventors then point out that in compounding the ink for use in type printing, it is important that the mixture be of a slow-drying nature, as the ink is spread over a large surface, which naturally permits of a rapid evaporation of the volatile ingredients. This, of course, is the problem stated by Gessler, which he claims to have solved in the same manner. It would therefore seem that the Lefferts and Stevens patent, while old, teaches what is necessary in order to make a heat-set ink, such as Gessler describes.

Next cited is the Howard Waters Doughty patent, application filed August 14, 1922, and patent issued December 26, 1922, No. 1,439,696. This invention is said to relate to inks and vehicles therefor, and particularly to metallic inks suitable for use in stamping titles and decorative designs on book bindings. This patent, however, is apparently not confined to metallic ink, for the inventor says (line 67, col. 2, p. 2):

> "The color will depend upon the particular pigment employed which may be other than metallic in character".

Memorandum.

He states the difficulty which has prevented the use of metallic inks at the outset to be due to vehicles which dry too rapidly on the inking rolls, covering them with a gummy coating, preventing transfer of the ink to the type or die, and that the object of his invention is to provide an ink having the necessary properties, including comparative slowness in drying, without a tendency to become gummy, and a transference of the ink through inking rolls to the type, or die, rapid drying when applied to the work, etc. (p. 1, col. 2, lines 55-70).

He then says in the second column, first page, that the desirable properties sought, to wit, slowness in drying without the tendency to become gummy, etc., may be obtained by using a suitable medium that will permit rapid drying of the ink by the application of heat to the type, or die, and one that should be volatile; that is capable of being vaporized without carbonization, with a boiling point relatively high to reduce vaporation at atmospheric temperatures, and thus prevent rapid drying on the ink rolls. Furthermore, that the medium must be a solvent for the body of the vehicle, with a boiling point within 200° and 300° C., 250 C. being most desirable. It will be recalled that the boiling point of butyl carbitol is within this range.

It is apparent at once that Doughty is talking about a printing ink with a volatile solvent that will not dry on the rolls, and capable of being dried by heat, the patent saying (p. 1, col. 2, line 62):

> "The medium should be volatile, i. e., capable of being vaporized without carbonization, but its boiling point should be relatively high to reduce vaporization at atmospheric temperatures, and consequently to prevent rapid drying on the inking rolls".

Next, adverting to the McElroy patent, No. 1,450,692, application filed June 16, 1922, patent granted April 3, 1923, the object is stated to be (p. 1, col. 1, line 24):

Memorandum.

> "* * * the production of improved printing inks * * * characterized by" (p. 1, col. 1, line 34), "the qualities of drying immediately under the relatively high temperature preferred in embossing metallic powders; * * * of high boiling point and of low volatility".

And (p. 2, col. 2, line 96), that is why it

> "* * * should be used * * * at a temperature substantially that of the boiling point of the solvent vehicle. As will be obvious, however, the ink set forth may be used at lower temperatures, or cold, and the impression artificially dried thereafter".

Which, as counsel points out, you can print it as it is in the fountain, and then when the paper has the ink applied to it, it can be artificially dried. That the McElroy patent is not confined to metallic inks is indicated by the statement (p. 1, col. 1, line 20):

> "Out invention relates generally to printing inks and particularly to those having metallic powders as their pigments".

Jirousek in his patent, April 10, 1934, No. 1,954,627, application filed April 18, 1932, states the problem as Gessler does, to wit (p. 1, col. 1, line 1); that with the customary inks a great loss of time is incurred in setting or drying, before the further steps of cutting, folding, assembling and binding can be attended to, and that efforts to overcome this handicap have resulted in premature hardening of inks on the surfaces of the ink rolls, etc. That a composition, however, which can set quickly, dry rapidly and also handle and feed properly, and distribute freely, is an important desideratum highly desired in the art. That:

> "To the accomplishment of the foregoing and related ends, the invention, then, comprises the features

hereinafter fully described, and particularly pointed out in the claims" (p. 1, col. 1, line 15).

And describes his formula as follows:

> "In the use of such compositions, immediately after the impression is made, heat should be applied, and most advantageously this may be accomplished by a suitable heater, electric, gas, etc. arranged on or adjacent the press, so that the delivered printed impression is subjected to a substantial degree of heat to complete the setting action" (p. 1, col. 2, line 71).

The exact process stated by Gessler, who says that with his ink the printing operation may be carried on in the ordinary manner and at ordinary temperatures, and—

> "At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly" (p. 2, col. 2, line 17).

He pointed out next that no time, labor or material is wasted in delays incident to prolonged drying of the printed goods under the processes then in use.

Further, Jirousek points out that by his method

> "Jobs can be printed on both sides in one operation with one or more colors on both sides of the sheet without smearing or offset, and trapping or superimposing of colors takes place without requirement of particularity relative to printing tack, and the work may proceed to the next operation, such as cutting, folding, stitching, trimming, and other bindery operations" (p. 1, col. 2, line 109).

The difficulty Gessler claims to have overcome.

Memorandum.

In Claim 3 the Gessler patent states:

> "A printing ink which is substantially non drying at ordinary temperatures and dries instantly on heating of the printed matter * * *" (p. 3, col. 1, line 18).

And further on says:

> "* * * substantially all of the liquid component having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether * * *" (p. 3, col. 1, line 29).

20° C. is the same as 70° F., and is referred to as room temperature.

Next this solvent must have, according to the patent in suit.

> "* * * the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures * * *" (p. 3, col. 1, line 32).

150° C. is as hot as you can heat a piece of paper without scorching or burning it.

The claim is therefore that the vapor pressure of the liquid you use must, at 150° C. be similar to that of ordinary alcohol at room temperature. In other words you have got to have the vapor pressure as low as that of butyl carbitol at room temperature—which is very low indeed. This is required, because under the Gessler method, when the temperature ~~vapor pressure~~ goes up to 150°, the solvent must possess a high volatility and evaporate as quickly as ethyl alcohol would.

Plaintiff alleges that before the alleged infringement by the defendant its ink was in use commercially, with one change, from that described in the patent, to a cheaper solvent substituted for the solvent mentioned in the patent,

which was mentioned only to indicate the right vapor pressure; but now a cheaper solvent—butyl carbitol acetate—is used, which has the same vapor pressure characteristics. This change was necessitated because, as the record discloses, many printing concerns who tried its discarded butyl carbitol inks, because butyl carbitol adversely affected the glue and glycerine ink rolls in common use.

On the defense of lack of invention, the prior art as disclosed in the patents cited and discussed (*supra*), state the problem to be as Gessler does; that is, by use of a solvent that keeps the ink sufficiently soft, so that it can be properly distributed on the rollers without drying and gumming up the presses, and at the same time the ink must dry out quickly so that the paper web can be printed on both sides without too great a delay in between. This calls for a solvent like that used by both plaintiff and defendant, i. e., possessing characteristics of slow evaporation with quick increase in vapor pressure at high temperatures.

It is hard to believe the selection of a slow-evaporating solvent, as called for by the art, involved the exercise of the inventive genius, especially when there were available to the trade solvents of all kinds of vapor pressure. The manufacturers were ready to develop a solvent to order of the exact type requested for the particular purpose any ink manufacturer might have in mind. For instance, butyl carbitol is manufactured by the Carbide and Carbon Chemicals Corporation, and advertised as having a very low rate of evaporation, and recommended as an excellent solvent for nitrocellulose and resins, and said to be useful where a solvent with an extremely low rate of evaporation is required.

It might well be said that a mechanic skilled in the art, in solving this problem of evaporation, would naturally think of and try the application of heat in some form—the advantages of which are stated in all the prior art patents.

It would seem, therefore, that Gessler found that his highly volatile lacquer ink, when applied to the ink-trans-

ferring rolls of the printing press and exposed to the atmosphere dried too fast, and sought a solvent that did not evaporate so fast. That is exactly what he says he did (p. 1, col. 2, lines 2 and 6, *et seq.*). On cross-examination (R. pp. 1030-34), he said he tried different solvents and selected three from a long list—all of which he tried out—and finally accepted butyl carbitol.

In B. B. Chemical Co. *v.* Cataract Chemical Co., 122 Fed. (2d) 526, the patent in question dealt with improvements in making and using a softener of dried pyroxylin cement, to be used in attaching soles of shoes to the uppers. This cement had to be of a certain viscosity, and as Judge Chase states, the problem (p. 529), was to provide a softener which would cut the dried cement sufficiently without being so volatile that it would dry before the operator could place the parts in position in the press. The court says, p. 528:

> "The softening of pyroxylin, or nitrocellulose, cement could, as was well known, be accomplished 'by activating' or 'cutting' the dried cement with a thinner solution of the nitrocellulose dissolved in one or more of a number of its solvents such as acetone, ether, ethyl acetate, butyl acetate or the like. Some of these solvents were of the low boiling point, and some of the high boiling point variety. The lower the boiling point the higher the volatility and vice versa. This was well known and, presumably, any good chemist would obtain the desired volatility by selecting the needed solvent".

Gessler said (R. p. 1032), butyl carbitol possessed the property of low vapor pressure at room temperature, and rapid evaporation when heated above 100°. This being a property of the chemical itself, it could not be the subject of a patent. So all he did was to recognize the physical property of the only solvent he named in his patent—butyl carbitol—and thus obtaining the desired volatility by pick-

ing the proper solvent. As a matter of fact neither party uses butyl carbitol in their ink.

Doughty specified the boiling range of his solvent as being between 200° and 300° C. (p. 1, col. 2, lines 69 and 72), and named several such solvents, to wit, terpineol, benzyl alcohol, terpinyl acetate, benzyl acetate, ethyl benzoate. He also recommends petroleum solvents (p. 2, col. 1, lines 16 and 20).

Butyl carbitol came on the market about 1929. Gessler testified it was his custom to keep in touch with new solvents. Thus he learned about it. So there is the question, did he by selecting one of these new solvents, exercise the inventive talent or genius? According to Judge Patterson in Kaumagraph *v.* General Trade-Mark Corporation (U. S. Dist. Court S'n. Dist. of New York), not reported, affirmed in 102 Fed. (2d) 992:

> "It was a development plainly indicated by recent prior art, a change that was inevitable sooner or later, calling for nothing beyond the skill of the calling". (Citing cases.)

It would therefore seem, in the language of Judge Hand in Ruben Condenser Co. *v.* Aerovox Corp., 77 Fed. (2d) 266, that the patent in suit does not rest upon a patentable invention, but on one of those steps in an art which demand only patient experiment, the court pointing out that in chemistry it is possible to proceed by a system of trial and error. In that case the court goes on to say that invention demands

> "* * * something more than routine testing of obvious combinations".

Butyl carbitol has the characteristics of low vapor pressure at room temperature, with rapid evaporation when heated. The patentee merely recognized this inherent physical property of a suitable solvent—all as set out in the

catalog of the Carbide and Chemicals Corporation, from which Gessler selected butyl carbitol, and which also gave its temperature range.

Doughty and Gessler both recognized that the then current inks contained solvents that exaporated too quickly and dried on the rolls. Both solved this problem by substituting a solvent that would not evaporate so quickly at ordinary temperature. But such a solvent would not dry on the paper, so a heater was specified to do that. This heater was not, and of course could not be, claimed to be new or patentable. Gessler selected butyl carbitol, while Doughty specified (p. 2, col. 1, line 12), a proper solvent should have a minimum boiling point of substantially 230 C. to avoid too rapid a drying of the ink upon the rolls. Stating further (line 16), that certain higher boiling point liquid saturated paraffin hydrocarbons, e. g., those present in fractions of kerosene boiling above 250 C. at normal pressure may be employed instead of terpineol.

Furthermore, Lefferts and Stevens, No. 280,654 (p. 2, col. 2, line 109), speak of the necessity of drying the surface after the application of color:

> "By means of our improved ink, when used in connection with heat and pressure, as above stated, a hard and permanent impression is produced, and the printed sheets or articles may be piled together immediately after they are taken from the press".

The very improvement claimed by Gessler.

These catalogs from which list of solvents Gessler in 1930 selected butyl carbitol on account of its boiling point, also contained full instructions for making the varnish that Gessler said he invented, p. 13 of the 1929 catalog stating that butyl carbitol

> "* * * is an excellent solvent for nitrocellulose and resins".

Memorandum.

Furthermore Gessler states in his patent (p. 1, col. 2, line 44):

> "The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure at room temperature, but yet further characterized by a rapid rise in their vapor pressure curves upon elevation of the temperature,—that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised".

Again referring to the catalogs above referred to, we find it stated in reference to butyl carbitol:

> "* * * is especially useful in pyroxylin dopes and other plastics where a solvent with an extremely low rate of evaporation is required".

What is the law of the case?

> "'Anticipation' means the disclosure in the prior art of a thing substantially identical with the art or instrument for which a patent is sought. An invention is anticipated only if the invention already known or used by others in this country, or patented or described in a printed publication in this or any foreign country, is identical in substance with it", 48 C. J. §27 (2), p. 28.

Patents are granted to inventors or discoverers of anything new or useful

> "* * * not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof". 48 C. J. §26, p. 28.

Memorandum.

It is not essential in order to anticipate an invention that there be both prior knowledge and prior use. 48 C. J. §33 (3), p. 35.

> "To give a prior patent effect as an anticipation it is not necessary that the invention patented should be generally known, that its existence should have been known to the latter inventor, or that the art or instrument of the patent should be commercially successful". 48 C. J. §44 (4), p. 41.

In Sirocco Engineering Co. *v.* Sturtevant Co., 220 Fed. 137 (certiorari denied 238 U. S. 636), the court, after stating that the structure there had been patented in France said, p. 143:

> "We do not see how, in view of the statute and decisions, we can ignore these French patents, because they were not generally known and were not commercially successful. The law does not make these features essential in considering the structures of the prior art".

With respect to anticipatory effect, prior patents and prior publications rest upon the same ground. No valid patent could be obtained by the inventor for his invention if it was described in a printed publication in this or any foreign country before his invention or discovery thereof.

A printed publication, in the view of the patent law, is anything that is printed and made accessible to any part of the public.

A trade periodical entitled "Printing Equipment Engineer", December, 1931, contains the second half of an article by one M. E. Hanson entitled "Plastic Printing Inks for Rapid Drying". This article describes the same problem that Gessler worked on, referring to such inks as "heat and ozone reactive inks", the heat to be applied to the surface of the running sheet, drying sufficiently to set the ink

enough to run the other side. This article, taken as a whole, would seem to be a complete disclosure on most everything that Gessler claims in his patent, and whether he saw it or not, it is a good statement of the problem the art was wrestling with and the proper approach to the solution.

In a case such as this it has been held:

> "The defending party to prove his defense may do so by showing that the thing patented has been certified or discovered by some other person in this country prior to the alleged invention in the pending suit, or that it has been patented or described in some printed publication in this or any foreign country". Imhaeuser *v.* Buerk, 101 U. S. 647, at p. 660. See also Parks *v.* Booth, 102 U. S. 96.

According to Robinson on Patents, Vol. 1, pp. 446-456, a prior patent becomes a public document when duly granted by the state and issued to the patentee, and a prior publication must be a work of public character intended for general publication, within reach of the public, published before the date of the latter invention.

The Hanson article states that if heat and ozone are used the drying is sufficient to set the ink so that no slip sheets are required, and the whole stack being dry in a few minutes, while in the case of the ordinary inks employing no heat or ozone, the drying time, according to the author, was eight to ten hours, and slip sheets were required. The author states the general characteristics for a plastic ink to be one that will not dry in a thin film exposed to room air at 80° F. for several hours, as it might be spread upon rolls or plates, but merely at a touch of heat after being printed upon the paper dries almost instantly.

The general characteristics for a plastic ink are stated to be one not hardening on the rolls at room temperature; one that when heated on the printed sheet to not over 250°

F., will harden or dry in a small fraction of a second; one that will not deteriorate glue or other soft inking rolls. And:

> "One manufacturer has presented an ink capable of drying with a very brief exposure to heat which will remain moist on inking rolls and plates for a long time. There are many points to be worked out concerning its use as a commercial ink for magazines or newspapers. It gives great promise, however, there being little doubt as to its ultimate success if the necessary work upon it is persistently carried on to a finish".

It then points out the advantages of such an ink to be the elimination of wax sprays, slip sheets or offset paper rolls, and the ink would be less expensive. That such an ink can be dried in a foot or two of web length, and colors applied immediately upon the reverse side, and go to the folding devices at present speeds.

The author, it would seem, had correctly diagnosed the objections to the then used inks, and states the problem and the advantages of a heat-set ink, such as described, not only in the patent in suit, but in the prior art patents referred to (*supra*).

This discussion has been unduly prolonged. It leads us to the conclusion that the patent in suit was anticipated by the prior art patents and the publications referred to. The court is filing herewith findings of fact and conclusions of law to that effect. It is therefore unnecessary to unduly extend this opinion with a discussion of other points raised.

J. Foster Symes,
District Judge Sitting Within And For
The Southern District of New York.

May 22, 1943.

Findings of Fact and Conclusions of Law.

This cause coming on to be heard on this eighteenth day of January, A. D. 1943, and continuing through January 27, 1943. The plaintiff appearing by Robert W. Byerly, Esq. and Ralph M. Watson, Esq., and the defendant by Hoguet, Neary & Campbell (Walter H. Free, Esq. and John F. Neary, Jr., Esq.), and the court having heard the testimony and the argument of counsel and read the briefs filed, and now being fully advised in the premises, doth make its findings of fact and conclusions of law:

Findings of Fact:

1. This suit is for infringement of Claims 3, 10, 11, 12 and 13 of U. S. Patent No. 2,087,190 for a printing ink, issued to the plaintiff for an invention of Albert E. Gessler, plaintiff's title to which is admitted.

2. The patent in suit describes and claims a printing ink, which is non-drying at ordinary temperatures and dries rapidly on heating of the printed matter, and which comprises a pigment dispersed in a vehicle. The vehicle consists of a resin or cellulose compound, and a liquid having a vapor pressure at 20° C. as low as that of butyl carbitol at 20° C., and at 150° C., approximately that of ethyl alcohol at ordinary temperatures.

3. Printing inks which were substantially non-drying at ordinary temperatures and which dried rapidly upon heating of the printed matter were old in the art. Such inks are found and described in the following patents and publications:

Lefferts and Stevens	Patent No.	380,654	Apr. 3, 1888
Doughty	" "	1,439,696	Dec. 26, 1922
McElroy and Clarke	" "	1,450,692	Apr. 3, 1923
Jirousek	" "	1,954,627	Apr. 10, 1934

Hanson Article, December, 1931.

4. It is a common feature of all of these prior art inks that they remain moist on the printing press at ordinary temperatures and dry rapidly upon the application of heat.

5. Said prior art inks consisted of a pigment dispersed in a vehicle consisting of a liquid component and a solid component. In each case a solid component was a resin or cellulose compound. In each case also the solvents used had among them solvents with a vapor pressure which at 20° C. were as low as that of butyl carbitol and which at 150° C. approximated that of ethyl alcohol at ordinary temperatures.

6. The ink of the patent in suit involves no new principle but, on the contrary, utilizes the same principle as the inks disclosed in the aforesaid prior art patents and publications.

7. The patent in suit is anticipated by the patent of Lefferts and Stevens No. 380,654, the patent to Doughty No. 1,439,696, and the patent to Jirousek No. 1,954,627.

8. The patent in suit fails to display invention in view of the state of the prior art.

9. The patent in suit contains claims and disclosures which were made more than two years after public use of the ink, and hence were made too late to be valid.

10. The solvent of defendant's ink contains a solvent which has a vapor pressure at 150° C. of less than one-half of that of ethyl alcohol at ordinary temperatures.

11. The petroleum solvent ink of the plaintiff, which has enjoyed a commercial success, is not the ink described and claimed in the patent in suit.

CONCLUSIONS OF LAW.

1. The court has jurisdiction of the parties and the cause of action.

2. The Gessler patent in suit is anticipated and does not involve an invention, and is invalid.

3. The defendant's ink does not infringe the claims of the patent in suit.

4. The complaint herein should be dismissed and defendant recover its costs—to be taxed by the Clerk—and have execution therefor.

5. Defendant is entitled to judgment dismissing the complaint.

J. FOSTER SYMES,
District Judge, sitting within and for the
Southern District of New York.

Judgment.

This cause came on to be heard on the pleadings and proofs of the parties, and, upon the reading of the briefs filed on behalf thereof and upon the arguments of counsel, now thereupon, upon consideration thereof, it is hereby

ORDERED, ADJUDGED AND DECREED:

1. That the patent in suit No. 2,087,190 is invalid as to claims 3, 10, 11, 12 and 13 in suit;
2. That the defendant has not infringed said claims of the patent in suit;
3. That the Complaint be, and the same is, hereby dismissed;
4. That the defendant recover its costs herein in the sum of $657.57 as taxed by the Clerk, and have execution therefor.

Approved:

J. FOSTER SYMES,
U. S. D. J.

Dated: New York, N. Y.
June 29, 1943.

Approved as to form

ROBERT W. BYERLY,
Attorney for the Plaintiff.

June 28, 1943.

Judgment rendered.

GEORGE J. H. FOLLMER,
Clerk.

July 7, 1943.

Motion for a New Trial.

Plaintiff, Interchemical Corporation, moves for a new trial under the provisions of Rule 59 of the Federal Rules of Civil Procedure and prays:

1. That the Court open the judgment of dismissal which has been entered.

2. That the Court take additional testimony, viz.: the testimony of Milton E. Hanson as to the facts stated in his affidavit which is annexed hereto.

3. That the Court make new findings of fact and conclusions of law, and direct the entry of a new judgment in favor of the plaintiff.

The grounds of this motion are that the Court, in excluding the testimony of Milton E. Hanson at the trial, and thereafter relying on an article written by said Milton E. Hanson, made an error highly prejudicial to the plaintiff; that the Court has not been fully informed with respect to the state of the art because of the error in excluding the testimony of Milton E. Hanson, and has failed to evaluate the history of the art to which the patent in suit relates, and in consequence has erroneously held the patent in suit anticipated by prior patents and publications which failed to solve the problem which was successfully solved by the patent in suit; that the findings are incomplete and in part contrary to the evidence; that the conclusions that the patent in suit is invalid and not infringed are contrary to the law, all as set forth in detail in a memorandum submitted herewith.

The annexed affidavit of the aforesaid Milton E. Hanson will be relied upon in support of this motion.

Robert W. Byerly,
Attorney for Plaintiff,
225 Broadway,
New York City.

Affidavit of Milton E. Hanson.

STATE OF NEW YORK, }
COUNTY OF NEW YORK, } ss.:

MILTON E. HANSON, being duly sworn, deposes and says:

I am a mechanical and chemical engineer employed by B. F. Sturtevant Company of Boston, Massachusetts, in their office at Crestmont & Haddon Avenues, Camden, New Jersey. Neither I nor my employer has any connection with either party to the above-entitled litigation.

I reside at Haddonfield, New Jersey, which is less than one hundred miles from New York City.

Early in the Fall of 1931, I wrote an article entitled "Plastic Printing Inks for Rapid Drying", the second part of which was published in the December number of the publication "Printing Equipment Engineer", which I am informed constitutes a part of Defendant's Exhibit G in the above-entitled suit.

My article contained the following statement, which I am informed is quoted on page 19 of the opinion of the District Court in the above-entitled case:

> "One manufacturer has presented an ink capable of drying with a very brief exposure to heat which will remain moist on inking rolls and plates for a long time. There are many points to be worked out concerning its use as a commercial ink for magazines or newspapers. It gives great promise, however, there being little doubt as to its ultimate success if the necessary work upon it is persistently carried on to a finish."

The manufacturer to which I referred in this statement was Standard Textile Products Co. of Buchanan, New York. At the time I wrote the statement in the early Fall of 1931, I had received some sample inks from this company and had made some laboratory tests of them. After I had

written the above statement, I arranged to have these inks tested on a standard printing press and found that they dried and thickened so badly on the ink rollers of the press that they could not be used. I called this fact to the attention of Standard Textile Products Co. in a letter which I addressed to them on November 15, 1931. A photostatic copy of this letter is attached to this affidavit and marked "Exhibit A". I never succeeded in obtaining an operative quick-drying ink from this manufacturer.

In my said article I stated the characteristics which I believed that a quick-drying ink should have. These, as stated in the article, included:

> "1. One not hardening on rolls, plates or in fountain at room temperature even if press is stopped for several hours.
>
> "2. One when heated on the printed sheet to not over 250°F. [121°C.] will harden or dry in a small fraction of a second."

I worked for over a year with several different ink companies in an endeavor to produce an ink having these characteristics, but I never succeeded in getting or producing such an ink.

My work in endeavoring to develop a quick-drying ink started in August 1931. In it I was associated with Mr. Alfred MacKay, an engineer with the American Salpa Corporation of New York who put me in touch with the Standard Textile Products Co. of Buchanan, New York. At that time, I was in touch with the Curtis Publishing Company of Philadelphia and hoped to develop a quick-drying ink for magazine printing. In two letters which I addressed to the Standard Textile Products Co. on October 20, 1931, I told them that the Curtis Publishing Company had agreed to test the inks which I might develop and also pointed out the very large demand for such an ink. Photostatic copies of my two letters of October 20, 1931 to the Standard Textile

Products Co. are annexed to this affidavit and marked "Exhibit B" and "Exhibit C".

I worked with the Standard Textile Products Co. on the problem from August 1931 until December 1931. I tested the inks which I obtained from them on a printing press of the Curtis Publishing Company in November 1931 and found that they dried and thickened on the rollers, as pointed out in my letter of November 15, 1931, previously referred to and attached to this affidavit as "Exhibit A". Experiments and tests were continued until December 1931, but no usable quick-drying ink was developed. I terminated my work with the Standard Textile Products Co. on December 18, 1931.

After discontinuing work with the Standard Textile Products Co. in December 1931, I endeavored to obtain an ink having the characteristics specified in my article from other ink manufacturers. I first applied to the International Printing Ink Corporation and they advised me that they could not furnish such an ink. I then applied to Sinclair & Valentine, ink manufacturers in New York City. Over a period of about six months, Sinclair & Valentine furnished me with samples of a number of different inks which I tested to ascertain whether or not they had the desired characteristics. I found that all of them would dry on the rollers of a press and were unusable. After about six months, Sinclair & Valentine notified me that they could do nothing further on the problem, and I dropped the matter.

I have obtained a considerable number of United States patents on various inventions I have made. I never applied for a patent on a printing ink having the characteristics specified in my said article because I never succeeded in producing such an ink.

I called the facts which I have stated above to the attention of Mr. Robert W. Byerly, counsel for Interchemical Corporation, on January 7, 1943, and he requested me to appear as a witness for his client at the trial of the case

and said that he would notify me by telephone when my presence was required. He pointed out that, as I lived within one hundred miles from the place of trial, I could be subpoenaed to testify.

On January 25, 1943, Mr. Byerly telephoned me requesting me to appear in Court at the trial of this case on January 26, 1943. I told him that I was confined to my home by an attack of grippe and could not come to New York. A subpoena was then served on me requiring me to testify in New York, but, as I had considerable fever, my physician refused to let me come to New York on January 26. On January 27, 1943, I felt a little better and spent the morning journeying to New York (a trip of about three hours). I arrived in Court at 2:00 in the afternoon of January 27, 1943 and was informed that the trial had been concluded and that my testimony could not be taken. I remained in Court for an hour to listen to the oral arguments which counsel for the parties were presenting. Had it not been for my attack of grippe and the fever which I had on January 26, 1943, I should have been in Court on that day in obedience to the subpoena which was served on me.

MILTON E. HANSON

Subscribed and sworn to before me
this 8th day of June, 1943.

ALMA I. LUNDGREN
(Notary's Stamp)

[NOTARIAL SEAL]

Affidavit of Milton E. Hanson.

Exhibit A.

MILTON E. HANSON
MECHANICAL AND CHEMICAL ENGINEER
Member A.S.M.E.

204 Morgan Ave.,
Collingswood, N. J.
Nov. 15, 1931.

Mr. E. H. Frohner,
c/o Standard Textile Products Co.,
Buchanan, N. Y.

Mr. Frohner:

I received your last samples including the quart can of Black. You did not state whether this black was to match the thick magazine ink or the thinner newspaper ink.

I tried it on a magazine press in Philadelphia of the design as shown on the attached sketch. The ink was placed in the fountain and immediately spread over the inking rolls shown very nicely up to the last two. There it started getting thick and piling up and did not transfer to the plate at all as an ink, only as flakes and blotches. We got no printing at all. Within a minute or so we had to stop the press for fear of wedging the inking rolls.

What can you do about this? I would say we must have a much slower drying ink. Please make another quart can of black, thick like the magazine sample I brought to you at the time of my last visit, but to dry very much more slowly. Do not fear getting it too slow, we always can make them faster. These rolls revolve very rapidly and I suppose it is the air streams set up conduct the solvent away rapidly. The ink rubbed out thin on a piece of glass lasts much longer than on the rolls. Lets make this next one real slow and try that.

Affidavit of Milton E. Hanson.

Is there anything you can send me to make Batch No. 4 slower or should I return it to you. I am afraid now that Batch No. 1 you sent for the newspaper test scheduled for this week is going to be too fast for their rolls revolve even faster than on the press shown on the sketch attached.

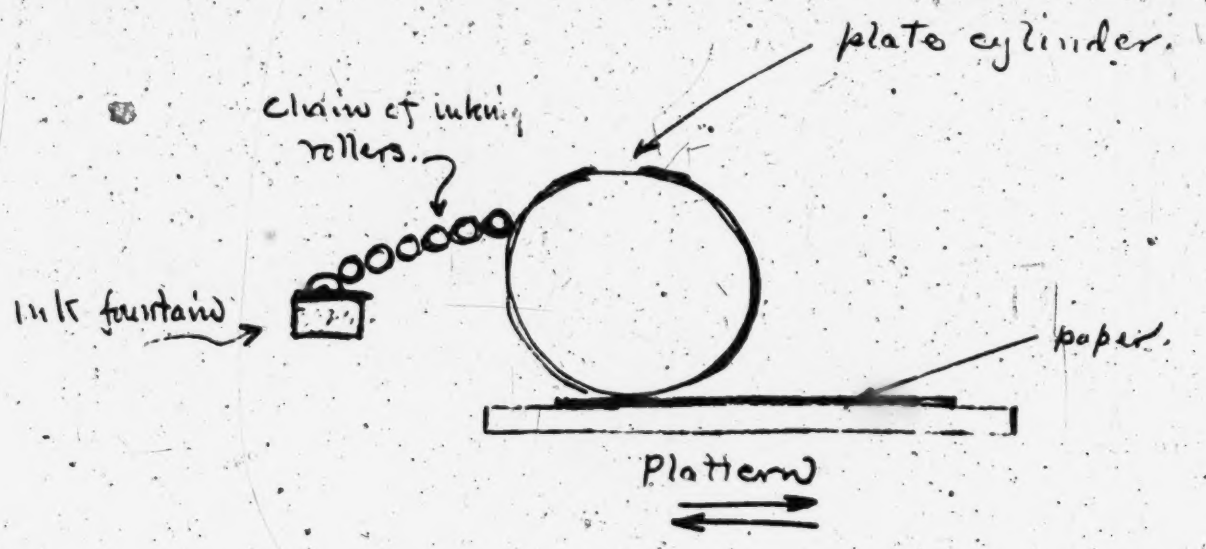
What do you think?

Very truly yours,

M. E. HANSON

Exhibit A.

(*Opposite* ☞)



1059

Sketch of ink transfer part of Flat Bed Press.

M E Hansen
Nov. 15 1931.

Exhibit B.

MILTON E. HANSON
MECHANICAL AND CHEMICAL ENGINEER
Member A.S.M.E.

204 Morgan Ave.,
Collingswood, N. J.
October 20, 1931.

The Standard Textile Products Co.,
Laboratory and Experimental Dept.,
Buchanan, N. Y.

Att: Mr. Frohner

Gentlemen:

Supplementing my letter of this same date please refer to the third paragraph concerning the Curtis Publishing Co. in which I asked for one gallon each of blue and red slow drying like that first one quart of blue you sent me. I did not state, though, that the consistency must be very thick. Magazine ink is so thick that it will not pour out of a can, just about the consistency of vasaline, possibly just a trifle thinner. If you get it a bit too thick I still have some of the thinner your gave Mr. Mackay to give me last September.

Do you think you can make such an ink? They use a chain of six rolls, 2" in dia. between the fountain and the type face to work the ink into a very closely controlled thin viscous film of thick pigment density. These rolls hunt longitudinally against each other causing each ink particle to take a zigzag course from the fountain onto the face of the type. Thus the reason for the thick paste like ink.

Also they say the pigment particles used must be 300 to 325 mesh, very fine as their screens on the type are very fine, twice as fine as the pictures you gave me when I was up to see you. Pick up any Saturday Evening Post and look at

the color printing under a good magnifying glass. They want good sharp edges on each individual little piece of the type screen.

This Curtis crowd are very exacting. I know them, I have worked with them many years. They incidentally are the best in the business. Their ink bill last year was very nearly two million dollars. Even a part of their business is worth going after.

Don't give up until I do.

Cincerely

M. E. HANSON

Exhibit C.

MILTON E. HANSON
MECHANICAL AND CHEMICAL ENGINEER
Member A.S.M.E.

204 Morgan Ave.,
Collingswood, N. J.
October 20, 1931.

The Standard Textile Products Co.,
Laboratory and Experimental Dept.,
Buchanan, N. Y.

Att: Mr. Frohner.

Gentlemen:

I had a very interesting meeting with the parties who are going to run some real tests on your ink for newspaper printing. It is going to take longer that I thought to get their press ready, about two weeks from now they say.

They ask for three gallon samples as the fountains available require that much to properly fill them. You will have

to send me two more gallons each of the red and blue, your Batch #1.

Curtis Publishing Co. have agreed to run a test on magazine printing. They like the very slow blue like the first Quart you sent me. It must not dry on plates as their presses run slowly, stopped often and shut down for three hours sometimes. Send me a gallon each of this slow in red and blue. They will use heat to dry with, a heat light stretched over the paper just as it leaves the printing cylinders.

I was talking with Mr. Mackay, yesterday. I believe he intends to see you. I need a cost price on this ink. People are now getting interested and are asking how much we are going to charge them for it.

Very truly yours,

M. E. HANSON.

Affidavit of Walter H. Free.

STATE OF NEW YORK, }
COUNTY OF NEW YORK, } ss.:

WALTER H. FREE, being first duly sworn, deposes and says:

That he is a member of the firm of Hoguet, Neary & Campbell, attorneys for the defendant in the above-entitled cause; that he prepared the case for trial and conducted the trial of the above-entitled cause on behalf of defendant; that in preparing the case for trial, a search among the prior art patents and publications disclosed an article by Milton E. Hanson, in the December 1931 edition of Printing Equipment Engineer, which set forth the complete requirements for a press-stable, heat-drying printing ink, and further indicated that the author had knowledge of inks which conformed to the requirements set forth in the article; that in September, 1942, he requested John M. Prutzman, one of the associates of the above-entitled firm, to arrange to meet Mr. Hanson for the purpose of ascertaining any further information that Mr. Hanson had, particularly with regard to the composition of the commercial heat-set ink mentioned in Hanson's article, and the name of its manufacturer.

On information and belief, deponent avers that on September 25, 1942, said John M. Prutzman interviewed Mr. Hanson in his office at the B. F. Sturtevant Company, Camden, New Jersey, and was informed by Mr. Hanson that he had done considerable experimenting with the inks described in his article and had made successful laboratory tests thereof and had witnessed tests of such ink on full-sized typographic presses; that said tests were successful, subject to slight refinements in the ink, principally to make it softer and more "buttery", so that the ink could be transferred more readily from the type to the paper; that on the basis of such substantially successful tests, Mr. Hanson wrote the said article in the Printing Equipment

Engineer; that Mr. Hanson averred that he had obtained the ink, so successfully tested on a full-sized press, from Standard Textile Products Company, of Buchanan, New York; that a Mr. Frohner of that company had compounded that ink, but Mr. Hanson did not know the composition of that ink.

That deponent, after receiving from Mr. Prutzman the report of his interview with Mr. Hanson, believed that further investigation of the commercial ink produced by Standard Textile Products Company and used successfully by Mr. Hanson, was justified, as a possible prior public use defense, and he thereupon requested Mr. Prutzman to get in touch with Standard Textile Products Company in order to ascertain the composition of the ink furnished Mr. Hanson.

On information and belief, Mr. Prutzman called at the office of Standard Coated Products Corporation, 40 Worth Street, New York City, formerly Standard Textile Products Company, and was informed that Standard Coated Products Corporation is a subsidiary or affiliate of plaintiff herein, and that no one connected with Standard Coated Products Corporation would be inclined to divulge any information or assistance which might be to the detriment of plaintiff in this action.

That inasmuch as complete information about the ink, as obtained by Mr. Hanson from Standard Textile Products Company, was peculiarly within the knowledge and under the control of plaintiff herein, deponent gave consideration to obtaining the deposition and records of said Mr. Frohner by subpoena and subpoena *duces tecum*, but before doing so deponent sought to locate Mr. Frohner, and ascertained that Mr. Frohner had died several years previously.

That in view of Mr. Frohner's death and the practical impossibility of obtaining information from Standard Coated Products Corporation, in view of its connection with plaintiff, deponent could not locate any one else who had knowledge of the facts regarding the composition of

these commercial inks referred to in the Hanson article of December, 1931; that shortly thereafter, deponent satisfied himself that the other defenses available to defendant were adequate to present the case to the Court for adjudication, and accordingly did not continue the investigation of the early ink of the predecessor of Standard Coated Products Corporation under the formal modes of discovery provided by the equity rules; and,

That the reason that the facts of Mr. Prutzman's interviews with Mr. Hanson, and with the officials of Standard Coated Products Corporation are not set forth in an affidavit by him is that Mr. Prutzman is now and has been since about March 10, 1943, with the armed forces.

WALTER H. FREE.

Subscribed and sworn to before me this 19th day of July, 1943.

LEE MANSELL,
Notary Public.

(Notary's Stamp.)

Opinion on Plaintiff's Motion for New Trial.

The plaintiff has filed a motion for a new trial, asking that the court take additional testimony and make new findings of fact and conclusions of law. The main ground urged is that the court excluded the testimony of one Milton E. Hanson. According to the record (pp. 1041-42), the defendant had introduced an article written by the said Hanson and published in a trade journal entitled "Printing Equipment Engineer" in 1931.

The court was willing to hear the testimony of Mr. Hanson, but he was not produced, and the court having waited

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r. 30, 1943.

~~several hours~~ to permit him to appear, closed the case. Counsel for the plaintiff in a colloquy with the court stated:

> "This witness will testify as to the state of the art * * *. I propose to call Mr. Hanson to show much more fully than this article does the state of the art."

Furthermore, counsel for plaintiff said, in response to a question by the court, that Mr. Hanson would

> "explain it and give a much clearer view of the art. No, he won't repudiate the fact that he wrote it, certainly."

The court further reminded counsel that it had given notice two or three times the case could no longer be delayed, and thereupon closed the testimony. Thus the court is asked to set aside its judgment and decision in a case that took at least eight days to try, in order to hear the testimony of Mr. Hanson, whose testimony, according to counsel, would not have taken more than half an hour.

A reading of the opinion indicates the court did not rely much upon the article of Hanson. The court made several findings of fact, only one of which would be affected by any testimony Mr. Hanson might have given on the state of the prior art. On this question—to which the court cited four patents as showing anticipation—a change in its decision, as requested, would require the court to rely upon testimony Hanson might give, and disregard the four patents cited by the court. The Hanson article in question gave complete specifications for the ink of Gessler—the patentee in question. All the latter had to do thereafter was to make a series of trial and error experiments to arrive at the particular solvent necessary for the manufacture of the ink in question. The solvent chosen by Gessler was disclosed to the art by the catalogue of Carbide and Chem-

icals Corporation (Plaintiff's Ex. G), from which the patentee admitted he selected the solvent he used.

The motion for a new trial is denied.

J. Foster Symes,
District Judge, sitting within and for the Southern Distfict of New York.

August 2, 1943.

Order.

This case coming on by motion of the plaintiff for a new trial, and upon consideration of the briefs and affidavits submitted in support thereof and in opposition thereto, it is hereby

Ordered that the said motion is denied.

Dated, New York, N. Y., August 27th, 1943.

J. Foster Symes,
District Judge sitting within and for the Southern District of New York.

Approved as to form:

Robert W. Byerly

Robert W. Byerly,
225 Broadway,
New York, N. Y.
Attorney for Plaintiff.

Notice of Appeal.

Notice is hereby given that Interchemical Corporation, the plaintiff above-named, hereby appeals to the Circuit Court of Appeals for the Second Circuit from the final judgment entered in this action on July 7, 1943, and from the order denying plaintiff's motion for a new trial entered in this action on August 30, 1943.

(Sgd.) Robert W. Byerly

ROBERT W. BYERLY,
Attorney for Appellant,
Interchemical Corporation,
225 Broadway,
New York City.

To:

HOGUET, NEARY & CAMPBELL,
90 Broad Street,
New York City.

Order, Dated October 8th, 1943.

On the annexed consent of the attorneys for the respective parties hereto, it is hereby

ORDERED that the time within which the plaintiff-appellant may serve the proposed record on appeal pursuant to Rule 31 of the Civil Rules of this Court be and it is hereby extended for a period of fifty-nine (59) days to December 11, 1943, and that the time within which the record on appeal may be filed and the action docketed pursuant to Rule 73(g) of the Federal Rules of Civil Procedure be similarly extended to the 11th day of December, 1943.

(Sgd.) GEORGE J. H. FOLLMER,
Clerk, United States District Court.

New York, New York,
October 8th, 1943.

The entry of the foregoing order is hereby consented to and notice of entry thereof is waived.

(Sgd.) ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant.

(Sgd.) HOGUET, NEARY & CAMPBELL,
Attorneys for Defendant-Appellee.
By W. H. FREE.

Order and Consent, Dated November 29, 1943.

On the annexed consent of the attorneys for the respective parties hereto, it is

ORDERED that the time within which the plaintiff-appellant may serve the proposed record on appeal be and it is hereby extended for a period of thirty-one (31) days to January 11, 1944, and that the time within which the record on appeal may be filed and the action docketed pursuant to Rule 73(g) of the Federal Rules of Civil Procedure be similarly extended to the 11th day of January, 1944.

(Sgd.) ALEXANDER M. BELL,
Clerk of the United States
Circuit Court of Appeals.

Dated, November 29, 1943.

The entry of the foregoing order is hereby consented to and notice thereof is waived.

(Sgd.) ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant.

(Sgd.) HOGUET, NEARY & CAMPBELL,
Attorneys for Defendant-Appellee.

By W. H. FREE.

Order, Dated January 6, 1944.

On the annexed consent of the attorneys for the respective parties hereto, it is

ORDERED that the time within which the plaintiff-appellant may serve the proposed record on appeal be and it is hereby extended for a period of thirty (30) days to February 10, 1944, and that the time within which the record on appeal may be filed and the action docketed pursuant to Rule 73(g) of the Federal Rules of Civil Procedure be similarly extended to the 10th day of February, 1944.

(Sgd) ALEXANDER M. BELL,
Clerk of the United States Circuit Court of Appeals for the Second Circuit.

Dated, January 6, 1944.

The entry of the foregoing order is hereby consented to and notice thereof is waived.

(Sgd) ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant.

(Sgd) HOGUET, NEARY & CAMPBELL,
by W. H. FREE,
Attorneys for Defendant-Appellee.

Order and Consent, Dated November 29, 1943.

On the annexed consent of the attorneys for the respective parties, it is hereby

ORDERED that the following original exhibits withdrawn from the District Court by, and remaining in the hands of, counsel for the respective parties hereto shall be filed by them in the Circuit Court of Appeals before the hearing of the appeal herein:

Plaintiff's Exhibits Nos. 6, 7, 8, 9, 10, 11, 12, 13, 15, 16 id., 17, 18, 19, 20, 29, 30, 31, 32, 34, 35, 36, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50 id., 51 id., 54, 55, 56, 58, 60, 61, 62, 66 id. and 67.

Defendant's Exhibits Nos. A, D, H, I, J, K, L-1, L-2, L-3, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, A-1, B-1, C-1, D-1, E-1, F-1, G-1, I-1, J-1, K-1, K-2, K-3, K-4, LL, M-1, N-1, O-1, P-1, Q-1, id., R-1 id., S-1, T-1, U-1, V-1, W-1, X-1, Y-1, Z-1, A-2, B-2, C-2, D-2, E-2, F-2, G-2, H-2, I-2, J-2, KK, LLL, M-2, O-2, R-2, S-2 and U-2.

(Sgd.) WM. BONDY,
United States District Judge.

New York, New York,
November 29, 1943.

The entry of the foregoing order is hereby consented to and notice of entry thereof is hereby waived.

(Sgd.) ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant.

(Sgd.) HOGUET, NEARY & CAMPBELL,
Attorneys for Defendant-Appellee.

By W. H. FREE.

Stipulation Regarding Record On Appeal.

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties hereto as follows:

1. That the following exhibits need not be reproduced and included in the printed record on appeal but that appellant shall bind up and furnish three copies of such omitted paper exhibits to the Circuit Court of Appeals at the argument of the appeal herein and will bind up and furnish an additional copy to counsel for the appellee:

Plaintiff's Ex. 13—Graph testified to by the witness Bragdon.

Plaintiff's Ex. 18—Diagram testified to by the witness Hurley.

Plaintiff's Ex. 20—Formulae cards for the nitrocellulose lacquer having laboratory code number 895-1, and the manufacturing code number W4608.

Plaintiff's Ex. 34—Copy of pamphlet entitled "Report of Committee on Standardization of Petroleum Specifications 'Bulletin No. 5'."

Plaintiff's Ex. 35—United States Government specifications testified to by the witness Taylor.

Plaintiff's Ex. 36—Catalogue of the Hilton Davis Company (cover and pp. 53, 54).

Plaintiff's Ex. 45—Chart testified to by witness Bragdon as showing the same curve as shown in Taylor's Exhibit B-1 in the upper line drawn in red.

Plaintiff's Ex. 46—Graph indicating the witness Bragdon's determination of the boiling point of the I. P. I. solvent.

Plaintiff's Ex. 47—Graph drawn by the witness Bragdon to show the comparison between the curves.

Plaintiff's Ex. 48—Photostat of pages from the book entitled "Petroleum."

Plaintiff's Ex. 50 id.—Proof of the vapor pressure of the kerosene about which the witness Bragdon testified.

Plaintiff's Ex. 51 id.—Chart showing the boiling range of the kerosene at about 250 made and testified to by the witness Bragdon and the kerosene above 250 given by Mr. Taylor on Exhibit B-1.

Plaintiff's Exhibit 54—Barrett Company's catalog (index, title page and page 12).

Plaintiff's Ex. 55—Chart showing the witness Bragdon's determination of defendant's 502-C ink oil, the I. P. I. petroleum solvent mentioned in Defendant's Exhibit B-1.

Plaintiff's Ex. 56—Chart showing that the vapor pressure of oil of cassia at 20 degrees is about .2 of a millimeter.

Plaintiff's Ex. 61—Schematic drawing showing the vapor pressure measuring apparatus in the plaintiff's laboratories.

Plaintiff's Ex. 62—Notebook which the witness Gessler kept of his work when he was the chief chemist of the Zinsser Company (3 pages relating to Experiment 842B; 4 pages relating to Experiment 842C; and 2 pages relating to Experiment 842E).

Plaintiff's Ex. 67—Smudged Montgomery Ward sheet.

Defendant's Ex. A—Set of curves referred to by the witness Bragdon.

Defendant's Ex. D—Memorandum testified to by the witness Hayward.

Defendant's Ex. J—Photostatic copy of the Brewer and Gardner article.

Defendant's Ex. K—Photostatic copy of the original of Chemical Society for 1888, pages 42-45 inc., which is referred to in the footnote 6 of the Brewer and Gardner Article.

Defendant's Exs. L-1, L-2, L-3—Photographs of the apparatus used by the witness Taylor to determine the vapor pressure characteristics of certain solvents.

Defendant's Ex. M—Report of Mr. Taylor on the vapor pressure of oil of cloves.

Defendant's Ex. N—Data sheet made by the witness Taylor in determining the vapor pressure for butyl carbitol.

Defendant's Ex. O—Chart referred to by the witness Taylor.

Defendant's Ex. P—Set of curves identified by the witness Taylor.

Defendant's Ex. Q—Set of curves showing solvents obtained from Lefferts and Stevens patent, including butyl carbitol and defendant's 502-C oil.

Defendant's Ex. W—Photograph illustrating the still used by the witness Taylor to obtain the petroleum fraction mentioned in the Doughty patent.

Defendant's Ex. X—Report of Mr. Taylor on the vapor pressure of kerosene fraction.

Defendant's Ex. A-1—Invoice and order identifying the kerosene used by the witness Taylor in making the solvent according to the Doughty patent.

Defendant's Ex. B-1—Distillation range chart testified to by the witness Taylor.

Defendant's Ex. C-1—Photograph of the standard equipment used for an A. S. T. M. distillation range test.

Stipulation Regarding Record on Appeal.

Defendant's Ex. D-1—Chart indicating the vapor pressures at various temperatures.

Defendant's Ex. E-1—Chart which is an enlargement of the vapor pressure chart given in "Industrial and Engineering Chemistry."

Defendant's Ex. F-1—Print from a Montgomery-Ward catalog bearing the signature of the witness Taylor.

Defendant's Ex. G-1—Pages 316 and 317 of the 1942 Pharmacopeia of the United States of America and page 235 of the 1882 volume of the United States Pharmacopeia.

Defendant's Ex. I-1—Straight line vapor pressure chart made and testified to by the witness Taylor.

Defendant's Ex. J-1—Photostatic copies of pages 352 and the fly-leaf of the Mellon Institute book published in 1920.

Defendant's Exs. K-1, K-2, K-3, K-4—Four invoices dated January 2, January 29, January 30, and February 15, 1941, from Magie Brothers Petroleum Products to Sinclair & Carroll Company, Inc.

Defendant's Ex. LL—Laboratory report marked "Laboratory No. 144,560 dated July 1, 1941 to Magie Bros. Oil Co., From Phoenix Chemical Laboratory, Inc."

Defendant's Ex. M-1—Fly-leaf and pages 124-128 inc. of Nelson's book entitled "Petroleum Refinery Engineering, First Edition" published in 1936.

Defendant's Ex. N-1—Card produced by the witness Theuer showing the first printing of the September 1930 "Metal Progress."

Defendant's Ex. P-1—Printing record testified to by the witness Theuer.

Defendant's Ex. R-1 id.—Formula for Jirousek ink.

Stipulation Regarding Record on Appeal.

Defendant's Exs. S-1, T-1—Order and reorder of the Commercial Printing & Litho Company.

Defendant's Ex. U-1—Sales slip of the A. L. Garber Company dated March 2, 1932.

Defendant's Ex. A-2—Invoice dated November 18, 1942, from Sinclair & Carroll to W. F. Hall Printing Co.

Defendant's Ex. F-2—Card dated November 3, 1942, entitled "Heat Set Varnish No. 20798."

Defendant's Ex. G-2—Formula card dated November 5, 1942, marked "Rotary Yellow, 1st Down, No. 20805."

Defendant's Ex. H-2—Formula card marked "Rotary Red, 2nd Down, No. 20806", dated November 5, 1942.

Defendant's Ex. I-2—Formula card dated November 5, 1942, marked "Rotary Blue, 4th Down, No. 20808."

Defendant's Ex. J-2—Formula card dated November 5, 1942, marked "Rotary Black, 3rd Down, No. 20807."

Defendant's Ex. KK—Montgomery-Ward Christmas book of 1942, page 59.

Defendant's Ex. O-2—Article in Industrial and Engineering Chemistry for July 1926 which was referred to in the filewrapper of the patent in suit.

Defendant's Ex. R-2—Comparative curves between butyl carbitol, the plaintiff's and defendant's solvent.

Defendant's Ex. U-2—1929-1930 Carbide & Carbon Chemicals Corporation catalog (title page, table facing page 7 and pages 16, 17).

2. IT IS FURTHER STIPULATED that the following exhibits may be regarded as physical exhibits and need not be reproduced by appellant:

Stipulation Regarding Record on Appeal.

Plaintiff's Ex. 6—Sample of ink with an alcohol solvent used by the witness Bragdon.

Plaintiff's Ex. 7—Film of ink on paper, the ink being that of Exhibit 6.

Plaintiff's Ex. 8—Second ink sample used by the witness Bragdon, being ink whose solvent is butyl acetate, having a vapor pressure of 1½ centimeters at room temperature.

Plaintiff's Ex. 9—Film made with ink (Exhibit 8).

Plaintiff's Ex. 10—Butyl carbitol ink.

Plaintiff's Ex. 11—Paper.

Plaintiff's Ex. 12—Sheet which the witness Bragdon placed on top of Exhibits 7 and 9.

Plaintiff's Ex. 15—Print testified to by the witness Cray as being the first heat-drying ink he saw.

Plaintiff's Ex. 16 id.—Memorandum in the handwriting of Dr. Dufford.

Plaintiff's Ex. 17—Sheet of November 12, 1932 belonging to Mr. Finne.

Plaintiff's Ex. 19—Sales invoices testified to by the witness Blackmore.

Plaintiff's Ex. 29—Series of invoices from the International Printing Ink Corporation running from December 19, 1933 to January 29, 1936.

Plaintiff's Ex. 30—Group of invoices running from August 12, 1936, through November 18, 1942, showing purchases made from the International Printing Ink Company.

Plaintiff's Ex. 31—Copies of formulae testified to by the witness Jeuck.

Plaintiff's Ex. 32—Copies of formulae MX-3858 and MX-3859.

Plaintiff's Ex. 39—Sheet from Life Magazine testified to by witness Busby as having been printed on one side.

Plaintiff's Ex. 40—Sheet which was printed with heat-set inks on Press 89.

Plaintiff's Ex. 41—Sheet testified to by witness Busby as having been printed on Press 100.

Plaintiff's Ex. 42—Sheet which was printed on a 2-color Life 64 page press.

Plaintiff's Ex. 43—Single-color heat set signature printed on a 64-page Life Press.

Plaintiff's Ex. 44—Single-color signature for Time Magazine printed on a 64-page Time press.

Plaintiff's Ex. 58—Ink prepared in accordance with the formula of the Doughty patent, containing four parts of terpineol, 1 part of rosin and 10 parts of bronze powder.

Plaintiff's Ex. 60—Ink vehicle of the McElroy patent produced by the witness Bragdon.

Plaintiff's Ex. 66 id.—Catalogs of the Carbide & Carbon Chemicals Corporation from 1930 to 1935.

Defendant's Ex. H—Piece of paper on which the witness Taylor made demonstration.

Defendant's Ex. I—Cardboard having on it four samples of printing, testified to by the witness Taylor.

Defendant's Ex. R—Sample container of defendant's solvent in the ink which is claimed to infringe.

Stipulation Regarding Record on Appeal.

Defendant's Ex. S—Sample of the ink which was made up in accordance with the Doughty patent.

Defendant's Ex. T—Sample of Doughty ink produced by Mr. Taylor.

Defendant's Ex. U—Sample of the Gessler ink.

Defendant's Ex. V—Sheet identified and described by the witness Taylor.

Defendant's Ex. Y—Tin of Lefferts and Stevens ink.

Defendant's Ex. Z—Sample of high boiling petroleum fraction obtained according to the Doughty patent.

Defendant's Ex. O-1—September 1931 issue of "Metal Progress."

Defendant's Ex. Q-1 id.—Six page folder "Believe it or not."

Defendant's Ex. V-1—Magazine offered in the deposition of witness Pellinger.

Defendant's Ex. W-1—Issue of "Metal Progress" dated January 1932.

Defendant's Ex. X-1—Issue of January 1932 "Your Garden and Home."

Defendant's Ex. Y-1—Issue of February 1932 "Your Garden and Home."

Defendant's Ex. Z-1—Issue of March 1932 "Your Garden and Home."

Defendant's Ex. B-2—Metal can marked Sinclair & Carroll Company "Rotary Yellow, 1st Down, No. 20805."

Defendant's Ex. C-2—Metal can marked "Rotary Red, Second Down, No. 20806."

Defendant's Ex. D-2—Metal can marked "Rotary Black, Third Down, No. 20807."

Defendant's Ex. E-2—Metal can marked "Rotary Blue, 4th Down, No. 20808."

Defendant's Ex. LLL—Sheet of paper referred to by the witness Carroll as a "draw down."

Defendant's Ex. M-2—Certified copy of the filewrapper of the application serial No. 15,944 filed April 21, 1935, referred to in line 30, column 2 of page 2 of the patent in suit.

Defendant's Ex. S-2—Samples of Alchemic Gold printing identified by the witness Satenstein.

Dated, November 29, 1943.

(Sgd.) ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant,
225 Broadway,
New York, New York.

(Sgd.) HOGUET, NEARY & CAMPBELL,
Attorneys for Defendant-Appellee,
90 Broad Street,
New York, New York.

By WALTER H. FREE.

It is so ordered:

.....
U. S. C. J.

Dated: ....., ...

Stipulation Regarding Record on Appeal.

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties hereto as follows:

1. The record on appeal shall include the transcript of all evidence taken at the trial herein, including all depositions offered at the trial herein in question-and-answer form, less the following:

(a) The opening statements of counsel.

(b) Colloquies between counsel and arguments to the court on questions of evidence.

(c) The closing statements of counsel.

2. Said record on appeal shall also include the following:

(a) The pleadings herein.

(b) The statement required by Rule 13 of the Circuit Court of Appeals.

(c) The decision of the Honorable John Foster Symes.

(d) The findings of fact and conclusions of law.

(e) The judgment herein.

(f) The plaintiff's motion for a new trial, supporting and opposing affidavits.

(g) The decision of the Honorable J. Foster Symes on plaintiff's motion for a new trial.

(h) The order denying plaintiff's motion for a new trial.

(i) The notice of appeal.

(j) The orders extending time to docket appeal.

(k) The order regarding exhibits.

Stipulation Regarding Record on Appeal.

(l) The stipulation regarding record on appeal.

(m) This stipulation.

(n) The stipulation as to correctness of record.

(o) Certificate of Clerk.

3. IT IS FURTHER STIPULATED AND AGREED that the record on appeal shall include all of the exhibits offered at the trial herein, provided, however, that it is stipulated that the following paper exhibits need not be reproduced and included in the printed record on appeal but that appellant shall furnish three copies of such omitted paper exhibits, properly bound up, to the Circuit Court of Appeals at the argument of the appeal herein and will furnish an additional copy to counsel for the appellee:

Plaintiff's Ex. 13—Graph testified to by the witness Bragdon.

Plaintiff's Ex. 18—Diagram testified to by the witness Hurley.

Plaintiff's Ex. 20—Formulæ cards for the nitrocellulose lacquer having laboratory code number 895-1, and the manufacturing code number W4608.

Plaintiff's Ex. 34—Copy of pamphlet entitled "Report of Committee on Standardization of Petroleum Specifications 'Bulletin No. 5' ".

Plaintiff's Ex. 35—United States Government specifications testified to by the witness Taylor.

Plaintiff's Ex. 36—Catalogue of the Hilton Davis Company (cover and pp. 53, 54).

Plaintiff's Ex. 45—Chart testified to by witness Bragdon as showing the same curve as shown in Taylor's Exhibit B-1 in the upper line drawn in red.

Plaintiff's Ex. 46—Graph indicating the witness Bragdon's determination of the boiling point of the I. P. I. solvent.

Plaintiff's Ex. 47—Graph drawn by the witness Bragdon to show the comparison between the curves.

Plaintiff's Ex. 48—Photostat of pages from the book entitled "Petroleum".

Plaintiff's Ex. 50 id.—Proof of the vapor pressure of the kerosene about which the witness Bragdon testified.

Plaintiff's Ex. 51 id.—Chart showing the boiling range of the kerosene at about 250 made and testified to by the witness Bragdon and the kerosene above 250 given by Mr. Taylor on Exhibit B-1.

Plaintiff's Ex. 54—Barrett Company's catalog (index, title page and page 12).

Plaintiff's Ex. 55—Chart showing the witness Bragdon's determination of defendant's 502-C ink oil, the I. P. I. petroleum solvent mentioned in Defendant's Exhibit B-1.

Plaintiff's Ex. 56—Chart showing that the vapor pressure of oil of cassia at 20 degrees is about .2 of a millimeter.

Plaintiff's Ex. 61—Schematic drawing showing the vapor pressure measuring apparatus in the plaintiff's laboratories.

Plaintiff's Ex. 62—Notebook which the witness Gessler kept of his work when he was the chief chemist of the Zinsser Company (3 pages relating to Experiment 842B; 4 pages relating to Experiment 842C; and 2 pages relating to Experiment 842E).

Plaintiff's Ex. 67—Smudged Montgomery Ward sheet.

Defendant's Ex. A—Set of curves referred to by the witness Bragdon.

Defendant's Ex. D—Memorandum testified to by the witness Hayward.

Defendant's Ex. J—Photostatic copy of the Brewer and Gardner article.

Defendant's Ex. K—Photostatic copy of the original of Chemical Society for 1888, pages 42-45 inc., which is referred to in the footnote 6 of the Brewer and Gardner Article.

Defendant's Ex. L-1, L-2, L-3—Photographs of the apparatus used by the witness Taylor to determine the vapor pressure characteristics of certain solvents.

Defendant's Ex. M—Report of Mr. Taylor on the vapor pressure of oil of cloves.

Defendant's Ex. N—Data sheet made by the witness Taylor in determining the vapor pressure for butyl carbitol.

Defendant's Ex. O—Chart referred to by the witness Taylor.

Defendant's Ex. P—Set of curves identified by the witness Taylor.

Defendant's Ex. Q—Set of curves showing solvents obtained from Lefferts and Stevens patent, including butyl carbitol and defendant's 502-C oil.

Defendant's Ex. W—Photograph illustrating the still used by the witness Taylor to obtain the petroleum fraction mentioned in the Doughty patent.

Defendant's Ex. X—Report of Mr. Taylor on the vapor pressure of kerosene fraction.

Defendant's Ex. A-1—Invoice and order identifying the kerosene used by the witness Taylor in making the solvent according to the Doughty patent.

Defendant's Ex. B-1—Distillation range chart testified to by the witness Taylor.

Defendant's Ex. C-1—Photograph of the standard equipment used for an A. S. T. M. distillation range test.

Defendant's Ex. D-1—Chart indicating the vapor pressures at various temperatures.

Defendant's Ex. E-1—Chart which is an enlargement of the vapor pressure chart given in "Industrial and Engineering Chemistry".

Defendant's Ex. F-1—Print from a Montgomery-Ward catalog bearing the signature of the witness Taylor.

Defendant's Ex. G-1—Pages 316 and 317 of the 1942 Pharmacopeia of the United States of America and page 235 of the 1882 volume of the United States Pharmacopeia.

Defendant's Ex. I-1—Straight line vapor pressure chart made and testified to by the witness Taylor.

Defendant's Ex. J-1—Photostatic copies of pages 352 and the fly-leaf of the Mellon Institute book published in 1920.

Defendant's Exs. K-1, K-2, K-3, K-4—Four invoices dated January 2, January 29, January 30, and February 15, 1941, from Magic Brothers Petroleum Products to Sinclair & Carroll Company, Inc.

Defendant's Ex. LL—Laboratory report marked "Laboratory No. 144,560 dated July 1, 1941 to Magic Bros. Oil Co., From Phoenix Chemical Laboratory, Inc."

Defendant's Ex. M-1—Fly-leaf and pages 124-128 inc. of Nelson's book entitled "Petroleum Refinery Engineering, First Edition" published in 1936.

Defendant's Ex. N-1—Card produced by the witness Theuer showing the first printing of the September 1930 "Metal Progress".

Defendant's Ex. P-1—Printing record testified to by the witness Theuer.

Defendant's Ex. R-1 id.—Formula for Jirousek ink.

Defendant's Exs. S-1, T-1—Order and reorder of the Commercial Printing & Litho Company.

Defendant's Ex. U-1—Sales slip of the A. L. Garber Company dated March 2, 1932.

Defendant's Ex. A-2—Invoice dated November 18, 1942, from Sinclair & Carroll to W. F. Hall Printing Co.

Defendant's Ex. F-2—Card dated November 3, 1942, entitled "Heat Set Varnish No. 20798".

Defendant's Ex. G-2—Formula card dated November 5, 1942, marked "Rotary Yellow, 1st Down, No. 20805".

Defendant's Ex. H-2—Formula card marked "Rotary Red, 2nd Down, No. 20806", dated November 5, 1942.

Defendant's Ex. I-2—Formula card dated November 5, 1942, marked "Rotary Blue, 4th Down, No. 20808".

Defendant's Ex. J-2—Formula card dated November 5, 1942, marked "Rotary Black, 3rd Down, No. 20807".

Defendant's Ex. KK—Montgomery Ward Christmas book of 1942, page 59.

Defendant's Ex. O-2—Article in Industrial and Engineering Chemistry for July 1926 which was referred to in the filewrapper of the patent in suit.

Defendant's Ex. R-2—Comparative curves between butyl carbitol, the plaintiff's and defendant's solvent.

Defendant's Ex. U-2—1929-1930 Carbide & Carbon Chemicals Corporation catalog (title page, table facing page 7 and pages 16, 17).

IT IS FURTHER STIPULATED that the following exhibits may be regarded as physical exhibits and need not be reproduced by appellant:

Plaintiff's Ex. 6—Sample of ink with an alcohol solvent used by the witness Bragdon.

Plaintiff's Ex. 7—Film of ink on paper, the ink being that of Exhibit 6.

Plaintiff's Ex. 8—Second ink sample used by the witness Bragdon, being ink whose solvent is butyl acetate, having a vapor pressure of 1½ centimeters at room temperature.

Plaintiff's Ex. 9—Film made with ink (Exhibit 8).

Plaintiff's Ex. 10—Butyl carbitol ink.

Plaintiff's Ex. 11—Paper.

Plaintiff's Ex. 12—Sheet which the witness Bragdon placed on top of Exhibits 7 and 9.

Plaintiff's Ex. 15—Print testified to by the witness Cray as being the first heat-drying ink he saw.

Plaintiff's Ex. 16 id.—Memorandum in the handwriting of Dr. Dufford.

Plaintiff's Ex. 17—Sheet of November 12, 1932 belonging to Mr. Finne.

Plaintiff's Ex. 19—Sales invoices testified to by the witness Blackmore.

Plaintiff's Ex. 29—Series of invoices from the International Printing Ink Corporation running from December 19, 1933 to January 29, 1936

Plaintiff's Ex. 30—Group of invoices running from August 12, 1936, through November 18, 1942, showing purchases made from the International Printing Ink Company

Plaintiff's Ex. 31—Copies of formulae testified to by the witness Jeuck

Plaintiff's Ex. 32—Copies of formulae MX-3858 and MX-3859

Plaintiff's Ex. 39—Sheet from Life Magazine testified to by witness Busby as having been printed on one side

Plaintiff's Ex. 40—Sheet which was printed with heat-set inks on Press 89

Plaintiff's Ex. 41—Sheet testified to by witness Busby as having been printed on Press 100

Plaintiff's Ex. 42—Sheet which was printed on a 2-color Life 64 page press

Plaintiff's Ex. 43—Single-color heat set signature printed on a 64-page Life Press.

Plaintiff's Ex. 44—Single-color signature for Time Magazine printed on a 64-page Time press

Plaintiff's Ex. 58—Ink prepared in accordance with the formula of the Doughty patent, containing four parts of terpineol, 1 part of rosin and 10 parts of bronze powder

Plaintiff's Ex. 60—Ink vehicle of the McElroy patent produced by the witness Bragdon

Plaintiff's Ex. 66 id.—Catalogs of the Carbide & Carbon Chemicals Corporation from 1930 to 1935

Defendant's Ex. H—Piece of paper on which the witness Taylor made demonstration

Defendant's Ex. I—Cardboard having on it four samples of printing, testified to by the witness Taylor

Defendant's Ex. R—Sample container of defendant's solvent in the ink which is claimed to infringe

Defendant's Ex. S—Sample of the ink which was made up in accordance with the Doughty patent

Defendant's Ex. T—Sample of the Doughty ink produced by Mr. Taylor

Defendant's Ex. U—Sample of the Gessler ink

Defendant's Ex. V—Sheet identified and described by the witness Taylor

Defendant's Ex. Y—Tin of Lefferts and Stevens ink

Defendant's Ex. Z—Sample of high boiling petroleum fraction obtained according to the Doughty patent

Defendant's Ex. O-1—September 1931 issue of Metal Progress

Defendant's Ex. Q-1 id.—Six-page folder "Believe it or Not"

Defendant's Ex. V-1—Magazine offered in the deposition of witness Pellinger

Defendant's Ex. W-1—Issue of Metal Progress dated January 1932

Defendant's Ex. X-1—Issue of January 1932 "Your Garden and Home"

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Defendant's Ex. B-2—Metal can marked Sinclair & Carroll Company "Rotary Yellow, 1st Down, No. 20805"

Stipulation Regarding Record on Appeal.

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Defendant's Ex. E-2—Metal can marked "Rotary Blue, 4th Down, No. 20808"

Defendant's Ex. LLL—Sheet of paper referred to by the witness Carroll as a "draw down"

Defendant's Ex. M-2—Certified copy of the filewrapper of the application serial No. 15,944 filed April 21, 1935, referred to in line 30, column 2 of page 2 of the patent in suit

Defendant's Ex. S-2—Samples of Alchemic Gold printing identified by the witness Satenstein

4. The appellant shall file with the District Court two printed copies of the record on appeal herein constituted as above stipulated simultaneously with the filing of the printed record in the Circuit Court of Appeals.

Dated, November 29, 1943

(Sgd.) Robert W. Byerly,
Attorney for Plaintiff-Appellant,
225 Broadway,
New York, New York.

(Sgd.) Hoguet, Neary & Campbell,
Attorneys for Defendant-Appellee,
90 Broad Street,
New York, New York.

By Walter H. Free,
Member of said Firm.

Stipulation as to Correctness of Record.

IT IS HEREBY STIPULATED AND AGREED by and between counsel for the respective parties hereto that the foregoing pages, together with the book of exhibits filed herewith, constitute a true and correct transcript of the record of the District Court in this case as agreed to and stipulated by the parties hereto in accordance with the provisions of Rule 75 (f) of the Federal Rules of Civil Procedure.

Dated February 1, 1944.

ROBERT W. BYERLY,
Attorney for Plaintiff-Appellant,
225 Broadway,
New York, New York.

HOGUET, NEARY & CAMPBELL,
Attorneys for Defendant-Appellee,
90 Broad St.,
New York, New York.

By WALTER H. FREE.
Member of said Firm

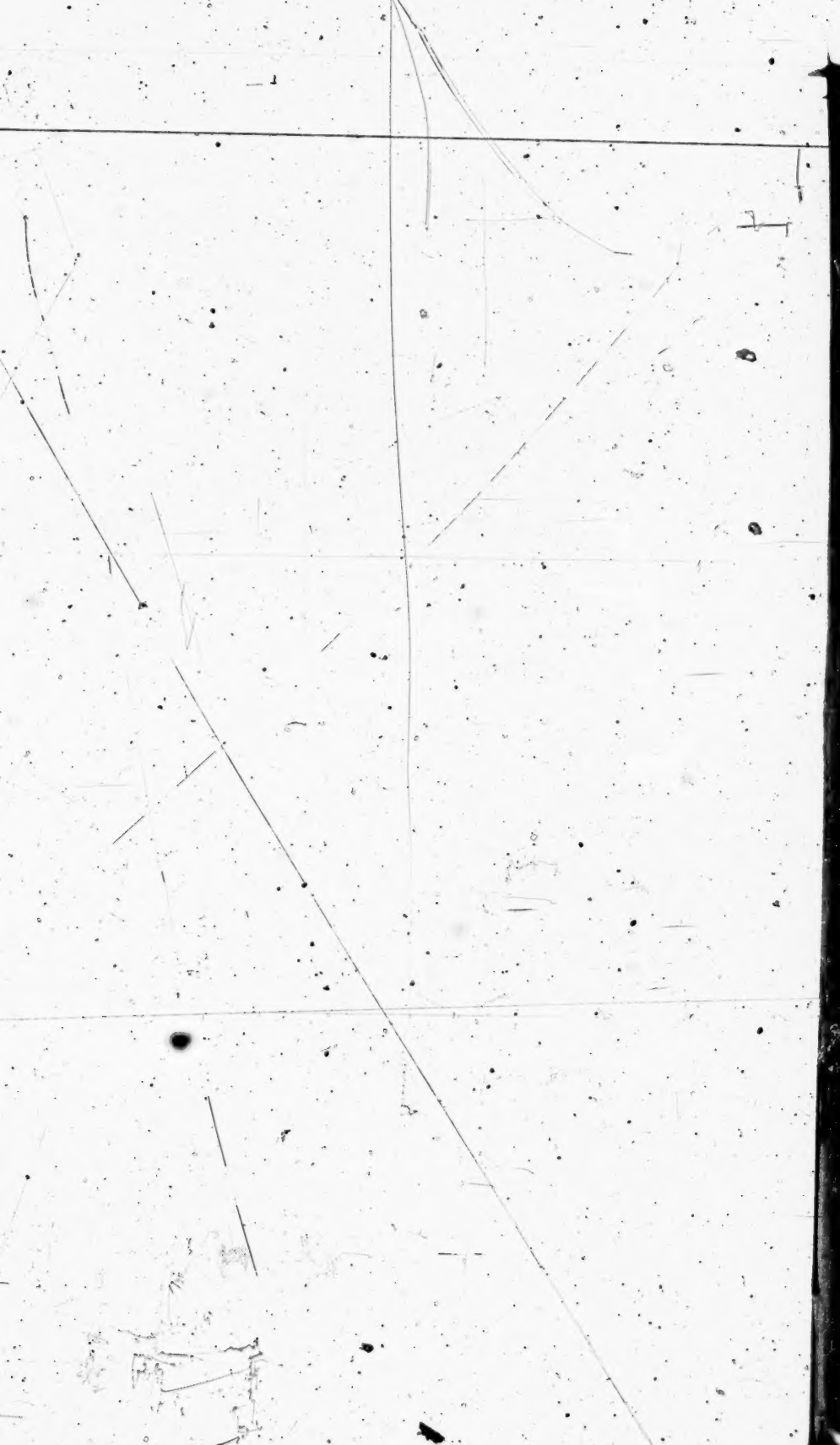
Clerk's Certificate.

UNITED STATES OF AMERICA,
SOUTHERN DISTRICT OF NEW YORK, } ss.:

I, GEORGE J. H. FOLLMER, Clerk of the District Court of the United States of America for the Southern District of New York, do hereby certify that the foregoing is a correct copy of the transcript of the record of the said District Court in the above entitled matter as agreed to by the parties.

IN TESTIMONY WHEREOF, I have caused the seal of said Court to be hereunto affixed at the City of New York, in the Southern District of New York, this 1st day of February in the year of our Lord, One thousand nine hundred and forty-four and of the Independence of the said United States, the one hundred sixty

GEORGE J. H. FOLLMER
Clerk



[fol. 1094] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT, OCTOBER TERM, 1943.

No. 336

(Argued May 10, 1944. Decided August 28, 1944)

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

against

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

Before Swan, Augustus N. Hand and Clark, Circuit Judges

Appeal from the United States District Court for the Southern District of New York

From a decree in a suit by the plaintiff, Interchemical Corporation, against the defendant, Sinclair & Carroll Company, Inc., for infringement of U. S. Patent No. 2,087,190, adjudging the patent invalid and not infringed, the plaintiff appeals. Reversed.

Robert W. Byerly and Ralph M. Watson, Counsel for Plaintiff-Appellant.

Hoguet, Neary & Campbell, Attorneys for Defendant-Appellee; Walter H. Free, Counsel.

[fol. 1095] AUGUSTUS N. HAND, *Circuit Judge*:

This is a patent suit brought by the Interchemical Corporation, assignee of U. S. Patent No. 2,087,190 to Gessler, against Sinclair & Carroll Company, Inc. Claims 3, 10, 11, 12 and 13 are in issue. The District Court held the patent invalid and not infringed as to those claims. The plaintiff Interchemical Corporation, appeals. We think that the claims are valid and infringed and that the decree should, therefore, be reversed.

The Gessler patent is for a printing ink and is directed to the composition of the ink and not to any method of printing. The great advantage of the Gessler ink is that it enables printing to be done on high grade non-absorbent paper with a smooth surface very rapidly and without smudging. The ink used is a volatilizable ink and differs from the inks which were in general use for printing formerly and are

still widely employed, the liquid part of which is linseed oil. Linseed oil cannot be volatilized and will only harden after a considerable time by absorbing oxygen from the air—a slow process requiring many hours for completion. In printing newspapers the drying of a linseed oil ink was not difficult because the soft paper used absorbed the ink when one side of the paper was printed and held it in position until after the back side of the sheet was printed in spite of the fact that the ink on the front side had not dried.

A different problem arose in printing on the smooth non-absorbent papers which are used for magazines. Such papers will not take up and hold the ink and the wet ink printed on one side is likely to be smudged by the ink on the other side. It was at first sought to correct this difficulty by running a separate web of "treated manila" through the press underneath the web of the paper that had been printed for the purpose of protecting the wet ink on the first side at the time when the second impression was [fol. 1096] being made. There were various other attempts to prevent smudging when linseed oil was used in the ink and at the same time to maintain a high speed in printing, but it remained impossible to print on smooth paper in a high speed press until an ink was discovered that would dry instantly when the proper time arrived. We think this discovery was made by Gessler. He discontinued the use of linseed oil in his ink and demonstrated the advantages of an ink that would volatilize rapidly instead of slowly oxidizing and would also retain its original consistency unchanged during its travel over a long series of ink rollers.

Volatilizable inks had before been used in rotogravure printing in which the ink was deposited on the paper from engraved recesses in the printing cylinder. But it was unnecessary in that process to maintain the original consistency of the ink unchanged while it was passing over a long series of rollers. The rotogravure cylinder rotates through a trough of ink, a steel doctor blade scrapes the excess ink off and the balance that is in the pockets below the surface is transferred onto the paper. As the witness Cray said there is "no question of rollers at all" (Record, p. 97). Metallic inks which were dried by evaporation had likewise been used for stamping letters on book bindings. These inks, like those used in the rotogravure process, contained no linseed oil but had a solution consisting of a solid

binder such as resin dissolved in a liquid solvent which boiled off at the temperature to which the printing die was heated.

We think the record clearly establishes that the trade had long striven to secure an ink that would maintain its consistency on the rollers until the web was imprinted and would then instantly dry on application of a sufficient amount of heat but had never succeeded in obtaining such an ink until Gessler made his invention. As a result his ink has been widely used on high speed printing presses [fol. 1097] and is regularly employed in printing such magazines as the "Saturday Evening Post," "Life," the "New Yorker" and "Colliers."

The specification of the Gessler patent refers to the delay in drying the ink and the difficulty in avoiding smudging where inks had been made with oils. It then refers to the use of cellulose lacquers having such a high degree of volatility that they hardened on the rollers of the press and failed to make a "satisfactory impression * * * on the material to be printed." Gessler describes his invention thus:

> "I have discovered * * * that if * * * cellulose compounds, particularly nitrocellulose, are dissolved in solvents with high boiling points, this difficulty may be avoided. * * *
>
> "The referred to solutions, * * * are characterized by their very low rate of evaporation at temperatures approximating room temperature and by their ability to manifest a relatively high degree of volatility when subjected to temperatures higher than room temperature. The solvents or solvent mixtures utilized in the formation of these solutions may be described as solvents having a high boiling point combined with a low vapor pressure at room temperature, but yet further characterized by a rapid rise in their vapor pressure curves upon elevation of the temperature,—that is, by their property of evaporating quickly from a thin layer, as in a print, when the temperature is sufficiently raised. Among this peculiar class of solvents I have found as an example diethylene glycol monobutyl ether to be a solvent for nitro-cellulose and many natural and artificial gums, very well adapted to the purposes of this invention. This solvent at room

temperatures remains fluid and moist for a long period of time. When heated to about 100° C. or above, the [fol. 1098] rate of vaporization is greatly accelerated and, when used in the ink of this invention, produces a print which dries almost instantaneously when subjected to such a heat treatment.

* * * * * * *

"With ink prepared as above, the printing operation may be carried out in the ordinary manner and at ordinary temperatures. At the conclusion of the printing operation, the printed materials may be subjected, in known manner, to sufficient heat to dry the thin film of the print very rapidly. Thus a finished print is obtained immediately at the end of the printing and heating operation and no time, labor, nor material is wasted in delays incident to the prolonged drying of the printed goods under the processes at present in use."

The third claim which contains the important elements of the others in suit reads as follows:

"3. A printing ink which is substantially non-drying at ordinary temperatures and dries instantly on heating of the printed matter, consisting of coloring matter dispersed in an organic viscous vehicle consisting of a liquid component and a solid component completely dissolved in the liquid component in sufficient quantity to give the ink the consistency of an ordinary oil-varnish printing ink—the solid component being a member of the group consisting of natural and synthetic resins and cellulose compounds, substantially all of the liquid component having a vapor pressure at 20° C. as low as that of diethylene glycol monobutyl ether at 20° C., and the major part of the liquid component having a vapor pressure which at 150° C. approximates that of ethyl alcohol at ordinary temperatures and forming a stable solution with the solid component."

[fol. 1099] The claims of the patent in suit, which are relied on, were held by the District Court to have been anticipated by:

Lefferts and Stevens U. S. Patent No. 380,654, April 3, 1888

Doughty U. S. Patent No. 1,439,696, December 26, 1922

McElroy & Clarke U. S. Patent No. 1,450,692, April 3, 1923

Jirousek U. S. Patent No. 1,954,627, April 10, 1934

Hanson Article of December, 1931.

The Lefferts Patent

This is an old patent issued in 1888 and, therefore, a most unlikely reference in an art which shows a vain striving for many years thereafter to obtain a quick drying ink for ordinary printing. The Lefferts patent disclosed oil of cassia as a solvent. It was a natural mixture coming from the interior of China. There is no proof of what its vapor pressure was at the time when Lefferts applied for his patent. In other words, it was not a standard product and this is evident from the great variation of the vapor pressure of some of the samples of oil of cassia purchased in 1938 from the vapor pressure of butyl carbitol and the substantial correspondence of the vapor pressure of samples purchased in 1942. There is nothing in the Lefferts patent to show the critical vapor pressure of his solvent at room temperature or at temperatures at which it would vaporize. He says that for type printing the ink should be "of a slow drying nature," but does not say how slow. Nitro-benzole is also mentioned in the Lefferts patent among [fol. 1100] proposed solvents, but defendant's expert admitted that its vapor pressure is at least ten times that of butyl carbitol (Record p. 332).

Doughty and McElroy & Clarke Patents

These patents related to metallic pigment inks for application to bookbinding by means of a heated die. The inks were to take the place of the old process of affixing gold leaf. The metallic pigments were dispersed in a solvent of terpineol combined with a resinous substance as a thickening agent. Doughty in his specification says:

> "The ink dries very slowly at atmospheric temperature owing to the high boiling point of the volatile solvent. It dries rapidly, however, when applied with a heated die. * * * The ink described, though particularly suitable for book-binders' use, will serve other purposes of decorative printing."

Satenstein, the president of Alchemic Gold Company, testified that the ink was only used for stamping and was not satisfactory for ordinary printing. His company was an assignee of the Doughty and McElroy & Clarke patents, and sold them to Frederick H. Levey & Company, reserving however to itself the right to manufacture, sell and use them in stamping as distinguished from letter press and intaglio printing. The purchase of Levey & Company of rights under the Doughty patent was after it had succeeded in making an ink derived from the teachings of Gessler but which it hoped did not fall within the claims of his patent.

The terpineol which Doughty and McElroy & Clarke described as their solvent had a vapor pressure two or three times as high as that of butyl carbitol. When appellee made a test to prove the advantages of the Doughty and McElroy [fol. 1101] & Clarke inks he used 33⅓% of terpineol and 66⅔% of resin oil instead of the 95% of terpineol and 5% of resin oil recommended by McElroy & Clarke.

It is true that Doughty mentioned terpinyl acetate as among suitable solvents and that solvent has the same vapor pressure as butyl carbitol. But there was nothing in the patent to indicate that the vapor pressure of terpinyl acetate should be chosen for a quick drying ink for ordinary printing and the specification did not and could not indicate any satisfactory formula for such printing that would at once embrace this ingredient and terpineol which differed so widely in vapor pressures.

We cannot regard these patents which had contributed nothing to the ordinary printing art though they had issued about ten years prior to the Gessler patent as references that ought to defeat his invention.

The Jirousek Patent

This patent provides for an ink containing a large amount of linseed oil and clearly is not a proper reference against the Gessler patent.

The Hanson Article

This publication described the kind of ink desired by printers but not the way to get it or its composition.

Other patents discussed in the defendant's brief were U. S. Patent No. 1,752,462 to Smith, U. S. Patents Nos. 1,858,673 and 1,954,450 to Lawrence and U. S. Patent No. 1,806,965 to Clewell.

The Smith patent was intended for metallic inks to be used for stamping letters on book-bindings. It listed terpinyl acetate among various recommended solvents but, like the patent to Doughty already dealt with, mentioned [fol. 1102] terpineol as the solvent of most standard use. It contained no data as to the vapor pressure at room temperature of the particular solvent which might be selected or as to its vapor pressure when heated to 150° C., and the vapor pressures of terpineol and terpinyl acetate widely differed.

The Lawrence patents were not introduced as anticipations of Gessler but only to show that butyl carbitol, which is mentioned in each patent as a solvent, was known some years before the date of Gessler's invention. Each patent dealt with ink transfers upon fabrics known as decalcomania. The first gives a formula in which the solvent butyl carbitol represents 45 parts as compared with 300 parts in Gessler's ink. The ink made under either Lawrence patent would be a thick wax-like paste unfitted for ordinary printing. The specification of the second Lawrence patent shows a confusion and lack of understanding of vapor pressures for it says that: "Butyl-carbitol has a high vapor pressure at about 100° C, so that it does not evaporate with sufficient rapidity to substantially vary the composition of the marking material."

The Clewell patent was before the Patent Office, as was the Doughty patent, and the Gessler claims were nevertheless allowed. It mentions diethylene glycol as an ink solvent, but that solvent was only usable when combined with a stabilizer because it was too hydroscopic.

We hold that none of the patents of the prior art foreshadowed Gessler's invention which, as he say in line 20, column 2, p. 1 of his patent: "involves a recognition of the principle that some * * * high boiling solvents exhibit, at temperatures elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly, while at the same temperatures other show little change in their vapor pressures and therefore are practically non-volatile." He pointed out the critical vapor pressures necessary to achieve his result and [fol. 1103] furnished the art with a formula that would tell printers how to avoid difficulties that had beset them for years.

But the defendant argues and secured a finding to the effect that the patent in suit contains claims and disclosures made more than two years after public use of Gessler's ink. It relies on a sale in April 1933 of the ink described and an amendment which Gessler introduced in his specification on September 28, 1935, as the defendant insists, to cover butyl carbitol acetate which had a lower vapor pressure than butyl carbitol. It seems to us however that the mention of ethyl alcohol in the amendment for the purpose of indicating the vapor pressure butyl carbitol was to approximate at a temperature of 150° C. did not alter the invention and was different from introducing claims not previously described as was done in *Muncie Gear Co.* v. *Outboard Co.*, 315 U. S. 759.

The last question is whether the ink used by the defendant on its presses infringed the claims in issue of the Gessler patent. In our opinion it did. Most of the plaintiff's like the defendant's inks substituted a selected narrow cut of petroleum as a solvent in place of butyl carbitol. It was equally efficacious and much less expensive. The plaintiff's ink was checked for vapor pressure with Gessler's original solvent (Record p. 85). The defendant did not begin to make a heat set ink until 1938. It made the infringing ink for a customer after the plaintiff's ink had previously been on the market. Both the plaintiff and defedant and the Frederick Levey Company all made inks having a high boiling petroleum cut as a solvent after Gessler's invention had blazed the way. It is true that Doughty said in his patent that: "certain higher boiling liquid saturated paraffin hydrocarbons, e.g., those present in fractions of kerosene boiling about 250° C. at normal pressure may be employed instead of terpineol." We think that the plaintiff is right, however, in saying that this fur-
[fol. 1104] nished no adequate teaching for the substitution of a workable cut of petroleum as a solvent in the place of butyl carbitol.

Gessler made an ink employing butyl carbitol as a solvent and this solvent was used successfully in May 1932, by the Peterson Parchment Paper Company. In November, 1932 and during a part of 1933 the Cray-Finne Company using a like solvent obtained from the Zinnser Company, of which Gessler was the Chief Chemist, made up an ink, sold it to

the Curtis Publishing Company and witnessed its successful operation on the presses of the latter. But, after a time the butyl carbitol ink tended to crack the glue-glycerine rollers used by Curtis, so that Gessler substituted butyl carbitol acetate as a solvent, which had no deleterious effect on the rollers. The butyl carbitol ink was also sold in 1933 by the Manufacturer's Printing Company to the Vegetable Parchment Paper Company of Kalamazoo, Michigan and worked satisfactorily and without injury to the rubber rollers which the Kalamazoo Company had in its presses. In the meantime, the Frederick H. Levey Company which furnished most of the printing ink to Curtis, developed an ink similar in operation to the Gessler ink, which it had obtained from the Cray-Finne Company. It employed a high boiling petroleum product as a solvent resulting in a less expensive ink than the one in which butyl carbitol acetate was used. Mr. Cray of the Cray-Finne Company had informed the Curtis Company of the ingredients of the inks he had sold to the latter some three or four months before he saw the ink with the petroleum solvent running on the Curtis presses. This development was followed by the making of a similar ink by the plaintiff, in which a petroleum cut was used instead of butyl carbitol or butyl carbitol acetate.

It is argued that the use of a petroleum cut as a solvent was anticipated by the suggestion of kerosene for use in [fol. 1105] that capacity in the Doughty patent, but the composition of kerosene had changed since 1922 when the Doughty patent issued. Moreover kerosene is a mixture of a large number of different hydrocarbons with different degrees of volatility, whereas the vapor pressure of butyl carbitol is substantially constant during evaporation. The specially prepared petroleum solvents employed by the plaintiff and also by the defendant were introduced in the three petroleum inks after the information derived from the Gessler invention had become available and its teaching could serve as a basis for trying experiments with a solvent that had the characteristics of butyl carbitol and was much less expensive. In holding that the defendant followed the teachings of Doughty rather than those of Gessler, the District Court ignored these considerations as well as the testimony of Satenstein that the Doughty ink would not work for ordinary printing.

Finally, it is argued that the vapor pressure of the ink solvent of the defendant at 150° C. (known as 502-C.) does not approximate that of ethyl alcohol at ordinary temperature. The specification gives the vapor pressure of butyl carbitol at 150° C. as 6 cm., and of ethyl alcohol at ordinary temperatures as 4 cm. In our opinion, the vapor pressure of the defendant's solvent approximates that of ethyl alcohol within the meaning of that word as used in the claims. That the word "approximates" gives lee-way of at least 2 cm., is plain, since the vapor pressure of the solvent especially recommended in the specification was 6 cm., at 150° C., that is to say, 2 cm. greater than the pressure of ethyl alcohol at ordinary temperature. In other words, the vapor pressure of butyl carbitol is as close to the vapor pressure of ethyl alcohol, as is the vapor pressure of the defendant's solvent. The degree of difference that was regarded as precluding an approximation is illustrated by the solvent dibutyl pthalate mentioned at page 2, line 9, of the Patent as [fol. 1106] being a pressure of only .14 cm. at 150° C. and evaporating slowly. When the patent says that at 150° C. the vapor pressure of the solvent must approximate that of ethyl alcohol, it means approximate it for the purpose in question, that is, for making the ink dry quickly. This the defendant's solvent does.

Inasmuch as the defendant's ink was undoubtedly compounded with Gessler's teaching in view and the latter's device involved a highly important step in the art, it is only reasonable to hold that it is within the claims of the patent relied on. To employ an ink that would retain its consistency until the paper was imprinted and then would instantly dry on the application of an amount of heat not injurious to the paper, involved more than ordinary talent. By recognizing that some high boiling solvents volatilize rapidly upon a rise of temperature, while others remain practically non-volatile, and by defining the class useful for the purposes desired, Gessler satisfied a long felt want. He made an ink that was not the product of a pedestrian worker in a laboratory but of a chemist of imagination who was able to conceive of and employ a solvent that had the apparently inconsistent attributes of maintaining the consistency of the ink until it had passed over the rollers and

had done the printing and of then instantly evaporating, upon the application of heat, so that its surface would be dry and not rub off. We hold that Gessler devised such an ink and that his discovery was an invention for which a patent was justly awarded.

The Decree is reversed with directions to grant a judgment sustaining the claims in issue and holding them infringed, with the usual injunction and reference.

1105

United States Circuit Court of Appeals

For the Second Circuit

No. 336 — October Term, 1943

INTERCHEMICAL CORPORATION
Plaintiff-Appellant

v.

SINCLAIR & CARROLL COMPANY, INC.
Defendant-Appellee

PETITION FOR REHEARING

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United States Circuit Court of Appeals

For the Second Circuit

No. 336 **October Term, 1943**

INTERCHEMICAL CORPORATION,
Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC.,
Defendant-Appellee.

PETITION FOR REHEARING

Your petitioner, Sinclair & Carroll Company, Inc., Appellee in the above-entitled appeal, prays for a rehearing in this appeal, decided adversely to Appellee on August 28, 1944.

The grounds upon which this petition is based are:

1. The Court, in adjudging Gessler patent No. 2,087,190 to be valid, overlooked the controlling factor that the compounding of Gessler's ink, regardless of its novelty, did not amount to invention.

The Court's discussion of the issue of validity of Gessler's patent is directed principally to the question of whether or not Gessler's ink is novel—whether or not it was *anticipated* by the prior art patents and publications upon which petitioner relied at the trial. The Court determined that question—novelty—in respondent's favor.

Petitioner does not agree that Gessler's ink is not anticipated; but does not propose to reargue that issue here.

Petitioner does respectfully contend, however, that the Court has overlooked certain uncontroverted and admitted evidence of record which requires the finding that the compounding of Gessler's ink, regardless of novelty or lack of novelty, did not attain the dignity of invention. As Judge Hough wrote in *Boston Pencil Pointer Co.* v. *Automatic Pencil Sharpener Co.* (C. C. A. 2, 1921) 276 Fed. 910, 912, "novelty, however great, can never be put in the place of invention." The same principle was emphatically restated by the Supreme Court in *Cuno Engineering Corp.* v. *Automatic Devices Corp.* (1941) 314 U. S. 84, 90.

In considering the issue of invention, it does not oversimplify the facts to state that Gessler's contribution consisted only in substituting butyl carbitol (or other solvents having substantially the same vapor pressure as butyl carbitol) for the solvents theretofore used in printing inks, because the combination of the other ingredients of Gessler's ink is concededly old in the art (I, pp. 55, 95). This premise is affirmed by Gessler's own statement, adopted by the Court, that his patent is predicated upon "a recognition of the principle that some * * * high boiling solvents exhibit, at temperature elevated above room temperatures, such a remarkable and quick increase in their vapor pressure that they volatilize rapidly * * *." (Opinion, p. 2455.)

Inherent in this statement, and borne out by the remainder of Gessler's patent, is the premise, accepted by both petitioner and respondent, that it is the solvent, *per se*, that imparts to Gessler's ink the quick drying characteristics upon which Gessler bases his claims for patentability. In these circumstances we submit that the Court should consider and decide whether invention was required in Gessler's selection and use of the solvent described in his patent and very indefinitely covered by his patent claims.

Gessler cannot and does not deny that the problem (which was *not* original with Gessler) which his patent purports to solve was *merely* the *selection* of a suitable solvent for the cellulose derivatives or resins used in making printing inks. The problem was to find a solvent which would not vaporize at room temperature, but which would vaporize rapidly at the elevated temperatures to which paper is heated after printing.

This same problem had been stated, in so many words, by Hanson in December, 1931, in his article "Plastic Printing Inks for Rapid Drying." Hanson said that the general characteristics required of a quick-drying plastic ink was "one that will not dry in a thin film exposed to room air at 80° F. (26° C.) * * * but merely at a touch of heat after being printed upon the paper dries almost instantly" (II, p. 990, middle of first column). He also gave "the highest practical heat to apply to a printed sheet" as 250° F. (121° C.) and recognized that given a solvent with the proper vapor pressure (evaporation rate) at the two critical temperatures "it would not take us long to compound an ink to meet the general characteristics for a plastic ink set forth above", *viz.*, "one that will not dry in a thin film exposed to room air at 80° F. (26° C.) * * * but merely at a touch of heat after being printed upon the paper dries almost instantly" (II, p. 990, middle of second column).

Curiously enough, Hanson not only stated Gessler's problem earlier, but he also indicated the precise field in which the invention, if any, would reside in the solution of the problem so posed; *i. e.*, the selection of the solvent.

Thus, in July, 1932, when Gessler's application for patent was filed, Gessler's only problem was to select a solvent from those available to him which would have the desired vapor pressure (evaporation rate) characteristics which he wished to impart to his ink, as suggested by Hanson. Gessler's selection was made after the fashion characteristic of the routineer. He neither "*conceived of*" (as may be inferred from the Court's opinion) nor invented the solvent which he ultimately used. He merely

perceived that butyl carbitol (a new solvent developed in 1929 by Carbide and Carbon Chemicals Corporation and then offered and advertised for printing; II, pp. 985-989) had the desired evaporation characteristics. Gessler then *selected* that solvent according to the Carbide and Carbon Corporation's catalog specifications, as he admitted (I, pp. 720-722; II, pp. 985-988; III, Ex. U-2).*

This catalog information showed that butyl carbitol "is an excellent solvent for nitrocellulose and resins * * * with an extremely low rate of evaporation"; that it had the requisite low vapor pressure at room temperature (the catalog listed its vapor pressure at 20° C. as 0.05 mm., hence it clearly was not *volatile* at room temperature; II, p. 988); and that it had a boiling range from 215° C. to 235° C., "intermediate† between the high boiling nitrocellulose solvents and the plasticizers", which indicated to Gessler, as it would to any chemist, a high evaporation rate at elevated temperatures. At most, all that remained for Gessler to do was to determine whether the evaporation rate (vapor pressure) *inherent* in butyl carbitol was sufficiently great to dry (volatilize) rapidly. "When heated to 100° C. or above" (Patent, II, p. 733a, col. 1, ll. 4, 5; I, p. 720).

These circumstances, when given their proper weight, do not justify the conclusion that the District Court erred in finding (II, pp. 1042, 1048) that Gessler's ink was nothing more than a development plainly indicated by the introduction of butyl carbitol on the market in 1929, and, as such, was not a patentable invention.‡ Indeed, we think

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* Neither Hanson's article, nor the catalogs, nor the advertisement was cited by the Patent Office.

† Gessler and the Court both gave weight to the selection of an "intermediate" solvent; one not having too high or too low a boiling point, just as Hanson prescribed (Opinion, p. 2459; Patent, II, p. 733, col. 2, ll. 10-28; II p. 990, middle of second column).

‡ Also, a new use of an old substance, merely taking advantage of its known attributes, is not invention. *H. K. Regar & Sons v. Scott and Williams* (C. C. A. 2, 1933), 63 F. (2d) 229, 231; *Wallace v. F. W. Woolworth* (C. C. A. 2, 1943), 133 F. (2d) 763, 764).

that the District Court's finding cannot be avoided, without manifest error, in view of the decision of this Court in the closely parallel case of *Ruben Condenser Co.* v. *Aerovox Corporation* (C. C. A. 2, 1935), 77 F. (2d) 266, 267. In the *Ruben* case the invention of the patent there in suit consisted only of substituting glycol in place of glycerin in a dry electrolyte for a dry electrolytic condenser, just as, in the instant case, Gessler's contribution consisted of substituting butyl carbitol (or similar solvents having about the same vapor pressures at 20° C. and 150° C.) for the solvents then in use in printing inks.

In the *Ruben* case, glycol had not been used in a dry electrolyte, but had been used in wet electrolytes, just as, in the instant case, solvents having the same vapor pressures as butyl carbitol had not (according to the Court) been used in ordinary printing inks, but had been used in other kinds of ink (*i. e.*, both the Court and respondent concede that terpinyl acetate which Doughty discloses as a solvent for the ink of his patent has the same vapor pressure as butyl carbitol; Opinion, p. 2454; Respondent's Brief, p. 42).

In the *Ruben* case, as in the instant case, large scale production of the new ingredient suggested by the respective patentees began only a few years before the dates of the alleged inventions. In the instant case, moreover, Hanson, prior to Gessler, had published the *concept* of the Gessler ink and stated clearly that the only problem remaining was the *selection* of a solvent having stated vapor pressure characteristics, which would prevent the ink from "hardening on the rolls, plates or in fountain at room temperature", and which "when heated on the printed sheet to not over 250° F. (121° C.) will dry in a small fraction of a second" (II, p. 990, items 1, 2). Hanson further indicated that when a suitable solvent having his stated vapor pressure (evaporation) characteristics was found, "it would not take * * * long to compound an ink to meet the general characteristics" for rapid drying. In

these circumstances, the following language of Judge Learned Hand in the *Ruben* case in holding the patent there in suit invalid for want of invention seems to us to be controlling here (pp. 267, 268):

> "In the light of all this it seems to us that the patent does not rest upon an authentic invention, but upon one of those steps in an art which demand only patient experiment. Especially in chemistry it is possible to proceed by a system of trial and error, varying formulas by permutation and combination, and recording the results of each. Much that is valuable has been so discovered, and we will not say that the profitable survivals from such elimination can never be inventions; salvarsan for example, as its other name, '606', indicates, was hit upon by this method. Ordinarily invention demands more than that; some resumption of a line of experiment from which the art had looked away (E. I. Dupont De Nemours & Co. *v.* Glidden Co., 67 F. (2) 392, 397 (C. C. A. 2)), some departure which required originality or independence of conception; something more than routine testing of obvious combinations. Here we can find nothing more. * * * If the machine or composition appears shortly after some obstacle to its creation, technical or economic, has been removed, we should scrutinize its success jealously; if at about the same time others begin the same experiments in the same or nearby fields, or if these come to fruition soon after the patentee's, the same is true. Such a race does not indicate invention."

In these circumstances, petitioner respectfully submits that the Court was manifestly in error in failing to sustain the District Court's finding that the Gessler patent as to all claims in suit, is invalid for want of invention.

2. The Court, in adjudging Gessler's patent to be infringed, construed Gessler's claims so broadly as to render them invalid under the Statuté (U. S. C., Title 35, Sec. 33) for indefiniteness.

Gessler's patent discloses but one ink; an ink utilizing butyl carbitol as a solvent from which the ink derives the physical properties claimed for it in the patent.

Originally, and up to September 28, 1935, Gessler's claims were properly limited to what he had disclosed, an ink utilizing butyl carbitol, or substances having the same vapor pressure characteristics as butyl carbitol, as the solvent (File Wrapper, II, pp. 778, 779, 873-877). While Gessler was prosecuting his application for patent, inks using butyl carbitol *acetate** (which, at 150° C. has a vapor pressure of only 40 mm. as compared with the vapor pressure of 60 mm. for butyl carbitol at the same temperature) as a solvent, were compounded to correct the deficiency of butyl carbitol, as is admitted (I, pp. 91, 121-123, 140-142; II, p. 767, col. 2, ll. 4-26; II, pp. 951, 952).

In view of the successful use of butyl carbitol *acetate* ink, Gessler saw that it was essential for him to obtain claims in his patent which would be broad enough to include an ink using a solvent which had a vapor pressure of about 40 mm. at 150° C., if his patent was to dominate the use of *both* butyl carbitol and its derivative, butyl carbitol acetate, as solvents for his ink. Because Gessler's specification disclosed *only* butyl carbitol as a solvent, Gessler necessarily was faced with difficulty in finding the requisite support in his specification for claims of the desired scope. He overcame that difficulty by inserting into his specification a self-serving statement comparing the volatility of butyl carbitol (the disclosed solvent) at 150° C. with that of ethyl alcohol at room temperature. Ethyl alcohol was not put forward by Gessler as a solvent for his ink. It was referred to only as an example of a "highly volatile liquid" at room temperature so as to

* Butyl carbitol acetate ink is specifically covered by a later Gessler patent, No. 2,128,672, not here in suit (II, p. 766).

afford a basis of comparison for the volatility of his selected solvents at 150° C. (II, p. 733a, col. 1, ll. 72-75). By strange coincidence, however, the vapor pressure of ethyl alcohol at room temperature, although only ⅔ the vapor pressure of the disclosed butyl carbitol, is precisely that of butyl carbitol acetate at 150° C., namely, 40 mm. (II, p. 767a, col. 1, ll. 64-75). This insertion was obviously new matter,* but with the specification so amended, Gessler was able to obtain claims which defined his ink as one including a solvent which has a vapor pressure of not more than .02 mm. at room temperature and a vapor pressure at 150° C. which "approximates that of ethyl alcohol at ordinary temperatures."

Such claims (passing for the moment the question of their validity under the *Muncie Gear* case, a question which petitioner does not propose to re-argue here) are clearly broad enough to encompass undisclosed butyl carbitol *acetate* inks. However, such claims *cannot* satisfy the statutory requirement that the patentee shall "particularly point out and distinctly claim" his invention, and at the same time be construed broadly enough to include petitioner's ink which uses a solvent, the vapor pressure of which at 150° C. is about the same as that of *water* at room temperature (*i. e.*, petitioner's solvent has a vapor pressure of 19-20 mm. at 150° C. and water has a vapor pressure of 17-18 mm. at room temperature; I, pp. 317-320; III, Ex. O-2, p. 763, Fig. 3).

Such solvents (petitioner's petroleum solvent) at "elevated temperature" (*e. g.*, 150° C.) *do not* become a "highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol", which Gessler (Patent, II, p. 733a, col. 1, ll. 72-75) teaches are comprehended by his patent. Quite the contrary. Such solvents, being comparable in volatility at 150° C. with water at room temperature (which is *not* a "highly volatile liquid"), are clearly without the disclosure of Gessler's patent.

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* Insertion of new matter renders claims predicated thereon invalid (*Webster Co. v. Splitdorf Co.*, 264 U. S. 463, 465; *Dwight & Lloyd Sintering Co. v. Greenawalt* (C. C. A. 2, 1928), 27 F. (2d) 823, 828).

If, therefore, as the Court suggests in its Opinion, Gessler's claims may be construed as including petitioner's inks using solvents with a vapor pressure of 19-20 mm., at 150° C., and hence comparable to the vapor pressure of water at room temperature, such claims necessarily fail to "particularly point out and distinctly claim" Gessler's invention, as required by the Statute.

The Court's construction of these claims, moreover, renders the language used in both the claims and the specification meaningless to the art to which the patent is addressed. No man, skilled or unskilled in the art, would for a moment suggest that the vapor pressure of *water* "approximates" the vapor pressure of *ethyl alcohol* at room temperature. Indeed, Gessler himself negatives any such idea in that passage of his patent (II, p. 733a, col. 1, ll. 72-75) wherein he refers to ethyl alcohol as a "highly volatile liquid". While we do not deny that the word "approximates" in Gessler's claims permits of some "leeway" from the 40 mm. vapor pressure of ethyl alcohol at room temperature, we do assert that, if the claim is to serve its statutory purpose to particularly point out and distinctly claim the limits of Gessler's invention, the phrase "approximates that (vapor pressure) of ethyl alcohol" cannot be construed as including vapor pressures comparable to that of water. Even in a patent claim the word "approximates" must be given a meaning which approximates its dictionary definition, namely, "comes close to", and a vapor pressure of 19-20 mm. *does not "come close to"* 40 mm. Nor does the 20 mm. variation in vapor pressure between ethyl alcohol at room temperature (40 mm.) and butyl carbitol at 150° C. (60 mm.), serve to justify this construction. The fact that the Patent Office permitted Gessler to broaden his claims so as to reduce the lower limit of the vapor pressure of his solvent at 150° C. from 60 mm. to 40 mm. by his reference to ethyl alcohol, cannot now be used to permit him to disregard the plain language of his claims so as to broaden his

patent by *still further* reducing the lower limit for that critical vapor pressure of his solvent by an additional 20-21 mm.

Any such interpretation of Gessler's claims makes them meaningless and void. Either the claims of Gessler's patent mean what they say, that "approximates" the vapor pressure of ethyl alcohol at ordinary temperatures means "comes close to" that vapor pressure, or they are invalid for failure to comply with the Statute, U. S. C., Title 35, Sec. 33.

Gessler's claims, construed to cover respondent's ink fall directly afoul the rule of the Supreme Court in *United Carbon Co.* v. *Binney & Smith Co.* (317 U. S. 228, 234) where the Court said with respect to the claims there in suit:

> "Finally, what on first impression appears to be reasonable certainty of dimension disappears when we learn that 'approximately one-sixteenth of an inch in diameter' includes a variation from approximately 1/4th to 1/100th of an inch.
>
> So read, the claims are but inaccurate suggestions of the functions of the product, and fall afoul of the rule that a patentee may not broaden his claims by describing the product in terms of function."

In the *Binney & Smith* case, the Court also said (p. 236):

> "The statutory requirement of particularity and distinctness in claims is met only when they clearly distinguish what is claimed from what went before in the art and clearly circumscribe what is foreclosed from future enterprise. A zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field."

In the instant case, the construction of the Gessler claims urged by respondent and adopted by the Court

clearly creates a zone of uncertainty with respect to the lower limit of vapor pressure at 150° C. of the solvent coming within the Gessler claims. So construed, the claims must be held invalid for failure to comply with the statute. Alternatively, if the claims are capable of a definite construction, they specify no more than a solvent having a vapor pressure at 150° C. that "comes close to" that of ethyl alcohol at ordinary temperatures, *viz.*, 40 mm. So construed, the vapor pressure of petitioner's solvent at 150°, *viz.*, 19-20 mm., is not "close to" 40 mm. since it is less than one-half of 40 mm., and less than one-third of the vapor pressure at 150° C. of the only usable solvent Gessler taught the art, butyl carbitol (60 mm.).

WHEREFORE, your petitioner prays that a rehearing in this appeal be granted and that the petitioner be allowed to reargue the appeal to the end that the material errors which exist both in fact and in law in the Opinion filed herein may be corrected, and justice may be done in the premises.

Respectfully submitted,

HOGUET, NEARY & CAMPBELL,
Attorneys for Petitioner.

WALTER H. FREE,
MARK N. DONOHUE,
Of Counsel.

We hereby certify that we have examined the foregoing petition for rehearing and, in our opinion, the petition is well founded in point of fact and law, and it is not interposed for the purpose of delay.

WALTER H. FREE
MARK N. DONOHUE

[fol. 1120] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

Before Swan, Augustus N. Hand and Clark, Circuit Judges

Hoguet, Neary & Campbell, Walter H. Free, Mark N. Donohue, for the Petitioner.

Per CURIAM:

Petition for rehearing denied.

T. W. S., A. N. H., C. E. C., C. JJ.

Filed: September 22, 1944.

[fol. 1121] UNITED STATES CIRCUIT COURT OF APPEALS, SECOND CIRCUIT

At a Stated Term of the United States Circuit Court of Appeals, in and for the Second Circuit, held at the United States Courthouse in the City of New York, on the 22nd day of September one thousand nine hundred and forty-four.

Present: Hon. Thomas W. Swan, Hon. Augustus N. Hand, Hon. Charles E. Clark, Circuit Judges.

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

A petition for a rehearing having been filed herein by counsel for the appellee,

Upon consideration thereof, it is

Ordered that said petition be and hereby is denied.

Alexander M. Bell, Clerk.

[fol. 1122] [Endorsed:] United States Circuit Court of Appeals, Second Circuit. Interchemical Corporation v. Sinclair & Carroll Company, Inc. Order. United States Circuit Court of Appeals, Second Circuit. Filed Sep. 22, 1944. Alexander M. Bell, Clerk.

these circumstances, the following language of Judge Learned Hand in the *Ruben* case in holding the patent there in suit invalid for want of invention seems to us to be controlling here (pp. 267, 268):

> "In the light of all this it seems to us that the patent does not rest upon an authentic invention, but upon one of those steps in an art which demand only patient experiment. Especially in chemistry it is possible to proceed by a system of trial and error, varying formulas by permutation and combination, and recording the results of each. Much that is valuable has been so discovered, and we will not say that the profitable survivals from such elimination can never be inventions; salvarsan for example, as its other name, '606', indicates, was hit upon by this method. Ordinarily invention demands more than that; some resumption of a line of experiment from which the art had looked away (E. I. Dupont De Nemours & Co. *v.* Glidden Co., 67 F. (2) 392, 397 (C. C. A. 2)), some departure which required originality or independence of conception; something more than routine testing of obvious combinations. Here we can find nothing more. * * * If the machine or composition appears shortly after some obstacle to its creation, technical or economic, has been removed, we should scrutinize its success jealously; if at about the same time others begin the same experiments in the same or nearby fields, or if these come to fruition soon after the patentee's, the same is true. Such a race does not indicate invention."

In these circumstances, petitioner respectfully submits that the Court was manifestly in error in failing to sustain the District Court's finding that the Gessler patent as to all claims in suit, is invalid for want of invention.

2. The Court, in adjudging Gessler's patent to be infringed, construed Gessler's claims so broadly as to render them invalid under the Statute (U. S. C., Title 35, Sec. 33) for indefiniteness.

Gessler's patent discloses but one ink; an ink utilizing butyl carbitol as a solvent from which the ink derives the physical properties claimed for it in the patent.

Originally, and up to September 28, 1935, Gessler's claims were properly limited to what he had disclosed, an ink utilizing butyl carbitol, or substances having the same vapor pressure characteristics as butyl carbitol, as the solvent (File Wrapper, II, pp. 778, 779, 873-877). While Gessler was prosecuting his application for patent, inks using butyl carbitol *acetate** (which, at 150° C. has a vapor pressure of only 40 mm. as compared with the vapor pressure of 60 mm. for butyl carbitol at the same temperature) as a solvent, were compounded to correct the deficiency of butyl carbitol, as is admitted (I, pp. 91, 121-123, 140-142; II, p. 767, col. 2, ll. 4-26; II, pp. 951, 952).

In view of the successful use of butyl carbitol *acetate* ink, Gessler saw that it was essential for him to obtain claims in his patent which would be broad enough to include an ink using a solvent which had a vapor pressure of about 40 mm. at 150° C., if his patent was to dominate the use of *both* butyl carbitol and its derivative, butyl carbitol acetate, as solvents for his ink. Because Gessler's specification disclosed *only* butyl carbitol as a solvent, Gessler necessarily was faced with difficulty in finding the requisite support in his specification for claims of the desired scope. He overcame that difficulty by inserting into his specification a self-serving statement comparing the volatility of butyl carbitol (the disclosed solvent) at 150° C. with that of ethyl alcohol at room temperature. Ethyl alcohol was not put forward by Gessler as a solvent for his ink. It was referred to only as an example of a "highly volatile liquid" at room temperature so as to

*Butyl carbitol acetate ink is specifically covered by a later Gessler patent, No. 2,128,672, not here in suit (II, p. 766).

afford a basis of comparison for the volatility of his selected solvents at 150° C. (II, p. 733a, col. 1, ll. 72-75). By strange coincidence, however, the vapor pressure of ethyl alcohol at room temperature, although only ⅔ the vapor pressure of the disclosed butyl carbitol, is precisely that of butyl carbitol acetate at 150° C., namely, 40 mm. (II, p. 767a, col. 1, ll. 64-75). This insertion was obviously new matter,* but with the specification so amended, Gessler was able to obtain claims which defined his ink as one including a solvent which has a vapor pressure of not more than .02 mm. at room temperature and a vapor pressure at 150° C. which "approximates that of ethyl alcohol at ordinary temperatures."

Such claims (passing for the moment the question of their validity under the *Muncie Gear* case, a question which petitioner does not propose to re-argue here) are clearly broad enough to encompass undisclosed butyl carbitol *acetate* inks. However, such claims *cannot* satisfy the statutory requirement that the patentee shall "particularly point out and distinctly claim" his invention, and at the same time be construed broadly enough to include petitioner's ink which uses a solvent, the vapor pressure of which at 150° C. is about the same as that of *water* at room temperature (*i. e.*, petitioner's solvent has a vapor pressure of 19-20 mm. at 150° C. and water has a vapor pressure of 17-18 mm. at room temperature; I, pp. 317-320; III, Ex. O-2, p. 763, Fig. 3).

Such solvents (petitioner's petroleum solvent) at "elevated temperature" (*e. g.*, 150° C.) *do not* become a "highly volatile liquid like such highly volatile liquids as, for example, ethyl alcohol", which Gessler (Patent, II, p. 733a, col. 1, ll. 72-75) teaches are comprehended by his patent. Quite the contrary. Such solvents, being comparable in volatility at 150° C. with water at room temperature (which is *not* a "highly volatile liquid"), are clearly without the disclosure of Gessler's patent.

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* Insertion of new matter renders claims predicated thereon invalid (*Webster Co. v. Splitdorf Co.*, 264 U. S. 463, 465; *Dwight & Lloyd Sintering Co. v. Greenawalt* (C. C. A. 2, 1928), 27 F. (2d) 823, 828).

If, therefore, as the Court suggests in its Opinion, Gessler's claims may be construed as including petitioner's inks using solvents with a vapor pressure of 19-20 mm., at 150° C., and hence comparable to the vapor pressure of water at room temperature, such claims necessarily fail to "particularly point out and distinctly claim" Gessler's invention, as required by the Statute.

The Court's construction of these claims, moreover, renders the language used in both the claims and the specification meaningless to the art to which the patent is addressed. No man, skilled or unskilled in the art, would for a moment suggest that the vapor pressure of *water* "approximates" the vapor pressure of *ethyl alcohol* at room temperature. Indeed, Gessler himself negatives any such idea in that passage of his patent (II, p. 733a, col. 1, ll. 72-75) wherein he refers to ethyl alcohol as a "highly volatile liquid". While we do not deny that the word "approximates" in Gessler's claims permits of some "leeway" from the 40 mm. vapor pressure of ethyl alcohol at room temperature, we do assert that, if the claim is to serve its statutory purpose to particularly point out and distinctly claim the limits of Gessler's invention, the phrase "approximates that (vapor pressure) of ethyl alcohol" cannot be construed as including vapor pressures comparable to that of water. Even in a patent claim the word "approximates" must be given a meaning which approximates its dictionary definition, namely, "comes close to", and a vapor pressure of 19-20 mm. *does not* "*come close to*" 40 mm. Nor does the 20 mm. variation in vapor pressure between ethyl alcohol at room temperature (40 mm.) and butyl carbitol at 150° C. (60 mm.), serve to justify this construction. The fact that the Patent Office permitted Gessler to broaden his claims so as to reduce the lower limit of the vapor pressure of his solvent at 150° C. from 60 mm. to 40 mm. by his reference to ethyl alcohol, cannot now be used to permit him to disregard the plain language of his claims so as to broaden his

patent by *still further* reducing the lower limit for that critical vapor pressure of his solvent by an additional 20-21 mm.

Any such interpretation of Gessler's claims makes them meaningless and void. Either the claims of Gessler's patent mean what they say, that "approximates" the vapor pressure of ethyl alcohol at ordinary temperatures means "comes close to" that vapor pressure, or they are invalid for failure to comply with the Statute, U. S. C., Title 35, Sec. 33.

Gessler's claims, construed to cover respondent's ink fall directly afoul the rule of the Supreme Court in *United Carbon Co.* v. *Binney & Smith Co.* (317 U. S. 228, 234) where the Court said with respect to the claims there in suit:

> "Finally, what on first impression appears to be reasonable certainty of dimension disappears when we learn that 'approximately one-sixteenth of an inch in diameter' includes a variation from approximately 1/4th to 1/100th of an inch.
>
> So read, the claims are but inaccurate suggestions of the functions of the product, and fall afoul of the rule that a patentee may not broaden his claims by describing the product in terms of function."

In the *Binney & Smith* case, the Court also said (p. 236):

> "The statutory requirement of particularity and distinctness in claims is met only when they clearly distinguish what is claimed from what went before in the art and clearly circumscribe what is foreclosed from future enterprise. A zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims would discourage invention only a little less than unequivocal foreclosure of the field."

In the instant case, the construction of the Gessler claims urged by respondent and adopted by the Court

clearly creates a zone of uncertainty with respect to the lower limit of vapor pressure at 150° C. of the solvent coming within the Gessler claims. So construed, the claims must be held invalid for failure to comply with the statute. Alternatively, if the claims are capable of a definite construction, they specify no more than a solvent having a vapor pressure at 150° C. that "comes close to" that of ethyl alcohol at ordinary temperatures, *viz.*, 40 mm. So construed, the vapor pressure of petitioner's solvent at 150°, *viz.*, 19-20 mm., is not "close to" 40 mm. since it is less than one-half of 40 mm., and less than one-third of the vapor pressure at 150° C. of the only usable solvent Gessler taught the art, butyl carbitol (60 mm.).

WHEREFORE, your petitioner prays that a rehearing in this appeal be granted and that the petitioner be allowed to reargue the appeal to the end that the material errors which exist both in fact and in law in the Opinion filed herein may be corrected, and justice may be done in the premises.

Respectfully submitted,

HOGUET, NEARY & CAMPBELL,
Attorneys for Petitioner.

WALTER H. FREE,
MARK N. DONOHUE,
Of Counsel.

We hereby certify that we have examined the foregoing petition for rehearing and, in our opinion, the petition is well founded in point of fact and law, and it is not interposed for the purpose of delay.

WALTER H. FREE
MARK N. DONOHUE

[fol. 1120] UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

Before Swan, Augustus N. Hand and Clark, Circuit Judges

Hoguet, Neary & Campbell, Walter H. Free, Mark N. Donohue, for the Petitioner.

Per CURIAM:

Petition for rehearing denied.

T. W. S., A. N. H., C. E. C., C. JJ.

Filed: September 22, 1944.

[fol. 1121] UNITED STATES CIRCUIT COURT OF APPEALS, SECOND CIRCUIT

At a Stated Term of the United States Circuit Court of Appeals, in and for the Second Circuit, held at the United States Courthouse in the City of New York, on the 22nd day of September one thousand nine hundred and forty-four.

Present: Hon. Thomas W. Swan, Hon. Augustus N. Hand, Hon. Charles E. Clark, Circuit Judges.

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

A petition for a rehearing having been filed herein by counsel for the appellee,

Upon consideration thereof, it is

Ordered that said petition be and hereby is denied.

Alexander M. Bell, Clerk.

[fol. 1122] [Endorsed:] United States Circuit Court of Appeals, Second Circuit. Interchemical Corporation v. Sinclair & Carroll Company, Inc. Order. United States Circuit Court of Appeals, Second Circuit. Filed Sep. 22, 1944. Alexander M. Bell, Clerk.

[fol. 1123] UNITED STATES CIRCUIT COURT OF APPEALS, SECOND CIRCUIT

At a Stated Term of the United States Circuit Court of Appeals, in and for the Second Circuit, held at the United States Courthouse in the City of New York, on the 17th day of October one thousand nine hundred and forty-four.

Present: Hon. Thomas W. Swan, Hon. Augustus N. Hand, Hon. Charles E. Clark, Circuit Judges.

INTERCHEMICAL CORPORATION, Plaintiff-Appellant,

v.

SINCLAIR & CARROLL COMPANY, INC., Defendant-Appellee

Appeal from the District Court of the United States for the Southern District of New York

This cause came on to be heard on the transcript of record from the District Court of the United States for the Southern District of New York, and was argued by counsel.

On consideration whereof, it is now hereby ordered, adjudged, and decreed that the judgment of said District Court be and it hereby is reversed with costs.

It is further ordered that a Mandate issue to the said District Court in accordance with this decree.

Alexander M. Bell, Clerk.

[fol. 1124] [Endorsed:] United States Circuit Court of Appeals, Second Circuit. Interchemical Corporation v. Sinclair & Carroll Company, Inc. Order for Mandate. United States Circuit Court of Appeals, Second Circuit. Filed Oct. 17, 1944. Alexander M. Bell, Clerk.

[fol. 1125] Clerk's Certificate to foregoing transcript omitted in printing.

[fol. 1126] SUPREME COURT OF THE UNITED STATES

ORDER ALLOWING CERTIORARI—Filed December 11, 1944

The petition herein for a writ of certiorari to the United States Circuit Court of Appeals for the Second Circuit is granted.

And it is further ordered that the duly certified copy of the transcript of the proceedings below which accompanied the petition shall be treated as though filed in response to such writ.